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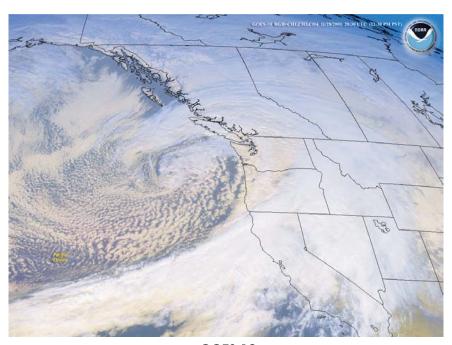




OFFICE OF THE FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

# National Winter Storms Operations Plan

FCM-P13-2005



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# NATIONAL WINTER STORMS OPERATIONS PLAN

FCM-P13-2005

Washington, D.C. December 2005

# CHANGE AND REVIEW LOG

Use this page to record changes and notices of reviews.

Change	Page	Date	Initial
Number	Numbers	Posted	
1			
2			
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Changes are indi	cated by a vertical line in the ma	argin next to the change.	
Review Date	Comments		Initial

#### **FOREWORD**

This is the 28th edition of the *National Winter Storms Operations Plan* (NWSOP). The purpose of the plan is to coordinate the efforts of the Federal meteorological community to provide enhanced weather observations of severe winter storms that impact the coastal regions of the United States. The goal is to improve the accuracy and timeliness of severe winter storm forecast and warning services provided by the Nation's weather service organizations. These forecast and warning responsibilities are shared by the National Weather Service, within the Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA), and the weather services of the United States Air Force and the United States Navy, within the Department of Defense. While the plan documents requirements for surface, upper air, and satellite observations of all types, it focuses on the coordination of requirements for aircraft weather reconnaissance observations provided by the Air Force Reserve Command's 53rd Weather Reconnaissance Squadron and NOAA's Aircraft Operations Center.

During January and February of 1998, winter storm missions were flown in the Northeast Pacific Ocean in support of an adaptive observing strategy experiment called NORPEX 98. Similar missions were successfully flown during the 1999 and 2000 seasons and have resulted in a continuing requirement to conduct winter storm missions in the North Pacific Ocean east of the international date line.

Within the organizational infrastructure of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM), the Working Group for Hurricane and Winter Storms Operations and Research (WG/HWSOR) is responsible for maintaining the plan. The 2004 edition of the plan was published in both hard copy and on the OFCM web site because the winter storm flight tracks for the Atlantic and Gulf of Mexico, Alaska, and Hawaii had undergone an extensive revision. While there are a number of revisions to this year's plan, they are considered to be relatively minor, and the tracks were not revised. As a result, this edition of the plan is being published as a web-only edition.

Samuel P. Williamson Federal Coordinator for Meteorological Services and Supporting Research

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#### **CHAPTER 1**

#### RESPONSIBILITIES OF COOPERATING AGENCIES

#### 1.1 General.

- **1.1.1 National Weather Service (NWS).** The National Weather Service (NWS) is responsible for issuing winter storm forecasts, watches, warnings, and advisories to the public and various special user groups. Its responsibilities are documented in *National Weather Service Policy Directive 10-5*, Public Weather Services, and in *NWS Instruction 10-513*, WFO Winter Weather Products Specification. For further details on NWSI 10-513, consult the NWS Directives web site at <a href="https://www.nws.noaa.gov/directives/010/010.htm">www.nws.noaa.gov/directives/010/010.htm</a> and click on <a href="https://www.nws.noaa.gov/directives/010/010.htm">10-513 WFO Winter Weather Products Specification</a>. The other files are regional supplements to this instruction.
- **1.1.2** U.S. Navy (USN). The U.S. Navy, through the Naval Meteorology and Oceanography Command (NAVMETOCCOM), is responsible for issuing gale, storm, high seas warnings, and winter weather forecasts for fleet operations and Navy shore installations and Marine Corps operations and installations, as elaborated in the NAVMETOCCOM Instruction 3140.1 series.
- **1.1.3** U.S. Air Force (USAF). The U.S. Air Force, through centralized weather units, is responsible for issuing military weather *watches*, warnings, and advisories to all Air Force and Army (including Reserve and National Guard) installations, facilities, and operations related to winter storms for those hazardous phenomena specified in local agreements (such as Memorandum of Agreements or local regulations).

#### 1.2 Responsibilities.

- **1.2.1** The Department of Commerce (DOC). The DOC, through the National Oceanic and Atmospheric Administration (NOAA), will:
  - Provide basic surface, upper air, and radar observations from its network of stations making such observations.
  - Provide additional observations, when required, making available all reports to any requesting agency.
  - Provide basic analyses and forecasts through the National Centers for Environmental Prediction (NCEP), Camp Springs, Maryland.
  - Provide products under the multitier concept from Weather Forecast Offices (WFO) which will provide outlooks, watches, warnings, and advisories, when appropriate.

- Provide advice on aircraft reconnaissance requirements forwarded through NCEP's
  Tropical Prediction Center/National Hurricane Center (TPC/NHC) to the Chief, Aerial
  Reconnaissance Coordination, All Hurricanes (CARCAH), from NCEP's
  Hydrometeorological Prediction Center (HPC) (the HPC is the central coordinating
  office for all winter storm reconnaissance requirements).
- Operate satellite systems capable of providing coverage of the coastal areas of the contiguous United States during the winter storm season.
- Coordinate with the National Aeronautics and Space Administration (NASA) to obtain pertinent meteorological data from NASA research and development experimental satellites.
- Coordinate with the Department of Defense (DOD) to obtain pertinent meteorological data from the Defense Meteorological Satellite Program.
- Provide satellite data for selected situations to authorized research facilities.
- Furnish aircraft from the NOAA Aircraft Operations Center (AOC) to support the following operational reconnaissance objectives:
  - The primary objective is to provide additional real-time meteorological data to operational forecasters in an attempt to improve the quality of forecasts associated with winter coastal storms.
  - < The secondary objective is to provide the data and analyses to better understand the structure and dynamics of these winter storm systems.
- Provide oceanographic and meteorological surface data obtained from offshore buoy deployment, if possible, within existing facilities.
- Provide dissemination of weather observations to appropriate agencies.

#### **1.2.2** The Department of Defense (DOD). The DOD will:

- Make available to NOAA agencies, through the Air Force Weather Agency (AFWA), basic surface, upper air, and radar observations from those DOD stations making such observations, pilot reports (PIREP), and aircraft reports (AIREP) that become available.
- Furnish to NWS, aircraft reconnaissance observations that are within its capabilities and in accordance with established reconnaissance priorities, and special observations detailed in Chapter 2 of this plan.
- Designate CARCAH as the point of contact for coordination with NCEP/HPC for aircraft reconnaissance required in support of this plan.

- Provide weather reconnaissance data monitor services to evaluate and disseminate reconnaissance reports.
- *Provide the necessary communications* to relay reconnaissance reports from the aircraft to CARCAH.
- Provide warnings to all DOD facilities and military units of weather that threatens to impact their operations or damage their installations.

#### 1.2.3 Department of Transportation (DOT).

#### **1.2.3.1 The Federal Aviation Administration (FAA).** The FAA will:

- Provide Air Traffic Control (ATC) services as appropriate to support this plan.
- Disseminate PIREPs and AIREPs.
- Provide hourly and special weather observations at selected terminal and flight service station locations.

#### 1.2.3.2 The U.S. Coast Guard (USCG). The USCG will:

- Provide surface observations to NWS from its coastal facilities and vessels.
- Collect special weather observations from surface ships of opportunity and provide them to the NWS.
- Provide personnel, vessel, and communications support to the National Data Buoy Center for development, deployment, and operation of environmental data buoy systems.

#### **CHAPTER 2**

#### AIRCRAFT RECONNAISSANCE

**2.1** General. All Department of Commerce (DOC) winter storm reconnaissance needs will be requested and provided in accordance with the procedures of this chapter. As currently defined, the winter storm season runs from 1 November through 15 April. The DOC has identified a requirement for, and the Department of Defense (DOD) maintains aircraft to support up to two operational weather reconnaissance sorties per day in the Atlantic. When aircraft are deployed to the Pacific, up to two additional operational sorties for the Pacific theater may be requested, resources permitting. In times of national emergency or war, some or all DOD reconnaissance resources may not be available to fulfill DOC needs.

#### 2.2 Responsibilities.

**2.2.1 DOD.** The DOD, through the Air Force Reserve Command (AFRC), is responsible for providing operational aircraft for winter storm synoptic tracks in the Atlantic Ocean, Gulf of Mexico, and North Pacific Ocean east of the international date line in response to DOC needs. In order to respond to DOC Pacific Winter Storm requirements, the 53<sup>rd</sup> Weather Reconnaissance Squadron (53 WRS) *can deploy* to either Elmendorf AFB, Alaska, or Hickam AFB, Hawaii, during the January and February time frame. *The DOC will pre-coordinate with AFRC/53 WRS to determine the amount of required deployed time prior to the winter storm season.* 

The Global Decision Support System (GDSS) JCS Priority Code for tasked, operational weather reconnaissance is **1A3** (IAW DOD Regulation 4500.9-R and Joint Publications 4-01 and 4-04). The Force Activity Designator (FAD)/Urgency of Need Designator (UND) Supply Priority Designator Determination code is **IIA2** (IAW Joint Publication 4-01 and Air Force Manual 23-110, Volume 2, Part 13, Attachment 3A-2.)

- **2.2.2 DOC.** The DOC, through the NOAA Aircraft Operations Center (AOC), is responsible for aircraft operations that will be used in support of National Centers for Environmental Prediction/ Hydrometeorological Prediction Center (NCEP/HPC) or as backup for 53 WRS aircraft reconnaissance for an East Coast storm or storm threat. Additionally, NOAA AOC aircraft missions may be flown on West Coast storms and storms of research interest as requested by the NOAA line offices. All such flights will be listed by the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) in the Winter Storm Plan of the Day (WSPOD) when provided to CARCAH by 1830 UTC.
- **2.2.3 DOT**. The DOT is responsible for providing air traffic control services to aircraft when within airspace controlled by the FAA. This includes offshore oceanic airspace. Detailed procedures for the expeditious handling of winter storm reconnaissance aircraft are outlined in paragraph 2.5, Reconnaissance Flights.

**2.3 Operational Control of Aircraft.** Operational control of aircraft flying winter storm reconnaissance missions will remain with the operating agencies of DOC or DOD, as appropriate.

#### 2.4 Reconnaissance Planning and Flight Notification.

- **2.4.1 Requirements.** NCEP/HPC will forward mission requirements to CARCAH for tasking in the WSPOD within the responsibilities stated above. The CARCAH will advise NCEP/HPC of mission availability or nonavailability and expected responsiveness of DOD and DOC assets. NCEP/HPC will be responsible for requesting all reconnaissance flights and will provide information as specified in paragraph 2.4.5. NCEP/HPC will also forward NWS mission requirements for the next 24-hour period (1100 UTC to 1100 UTC) and an outlook for the succeeding 24 hours to CARCAH not later than 1530 UTC each day *for East Coast requirements and 1830 UTC for West Coast requirements*. CARCAH will pass all tasking, amendments, and cancellations to the flying units.
- **2.4.2** Change to Requirements. Changes to mission requirements will be accepted by CARCAH based on the following guidelines:
  - Early departures will not be requested.
  - When notification is received more than 2 ½ hours prior to scheduled aircraft departure:
    - Changes to tracks normally will be limited to substitution of one track for another.
    - Departure delays of up to 6 hours will be acceptable in accordance with *HQ AMC C-130J Concept of Operations, Annex C, paragraph 3.4.4.2.*
    - Delays affecting missions operating under Altitude Reservation (ALTRV) procedures may cause cancellation of the ALTRV in accordance with "AVANA" procedures, FAA Order 7610.4, Special Military Operations.
    - When notification is received more than 4 hours prior to scheduled aircraft departure time, departure delay requests will be evaluated in accordance with appropriate flight management directives.
- **2.4.3** Cancellation of Requirements. Missions should be canceled prior to aircraft departure and as much in advance as possible to allow maximum resource conservation. Cancellation after departure may result in degradation of follow-on mission capability.

#### 2.4.4 Satisfaction of Requirements.

- **2.4.4.1 Satisfied.** Requirements are considered satisfied when an observation is or could have been taken (as in the case where aircraft are diverted from original track) at the specified location (control point) by the expiration time and a sufficient number of drops were accomplished to satisfy the customer's requirements.
- **2.4.4.2 Missed.** Requirements are either satisfied as per paragraph 2.4.4.1 or they are considered missed.
- **2.4.4.3 Written Assessment.** The requesting agency, NCEP/HPC and/or an NWS WFO, may provide CARCAH a written evaluation (Figure 2-1) of the weather reconnaissance mission any time its timeliness and quality are outstanding or substandard. Requirements levied as "resources permitting" will not be assessed for timeliness. These assessments should be mailed *or emailed* to CARCAH at:

CARCAH National Hurricane Center 11691 SW 17th Street Miami, FL 33165-2149 ncep.tpc.carcah@noaa.gov

**2.4.4.4 Reconnaissance Summaries.** CARCAH will maintain seasonal reconnaissance summaries detailing missions actually flown to satisfy levied requirements.

#### 2.4.5 Reconnaissance Winter Storm Plan of the Day (WSPOD).

- **2.4.5.1 Coordination.** NCEP/HPC will coordinate with the appropriate National Weather Service (NWS) field offices as needed and provide WSPOD information (Figure 2-2.) to CARCAH by 1530 UTC for East Coast requirements and 1830 UTC for West Coast requirements. Direct discussion in weather situations is also encouraged between the Navy and NCEP with respect to storms or storm threats. The East Coast Navy point of contact is the Naval Atlantic Meteorology and Oceanography Center (NAVLANTMETOCCEN) through their Norfolk Command Duty Officer. NCEP/HPC will provide the following data to CARCAH when applicable:
  - Track number
  - Selected trackpoint (control point) and time the aircraft is required at the point. (Note: On Atlantic tracks, the last required drop position will be the control point.)
  - Dropsonde release points and special requirements.

- Expiration time of requirement (latest time at the control point when the mission requirement is regarded as satisfied).
- Succeeding day outlook (anticipated track, control point, control point time).

**2.4.5.2 Preparation.** Using requirements stated by NCEP/HPC, CARCAH will prepare the WSPOD daily between November 1 and March 31, and at other times during the year as required. CARCAH will coordinate with DOD and DOC to effect maximum useful data from available resources. Format for the WSPOD is shown in Figure 2-3. The 53 WRS and NOAA AOC flight operations planners will plan tasked missions to meet Control Point/Control Time criteria and will fly the route in the most efficient direction possible, *unless specified otherwise*. If a specific direction is desired (clockwise or counterclockwise), it should be indicated in the WSPOD; e.g., *Track 32 CW or Track 64 CCW*. Tasking agencies should <u>not</u> use the terminology "Reverse" indicated by an "R" when requesting a track.

**2.4.5.3 Dissemination.** The WSPOD will be made available in message form to all appropriate agencies, such as FAA, DOD, and NOAA, that provide support or control reconnaissance aircraft. The CARCAH will be responsible for disseminating the WSPOD as soon as possible after DOC requirements, including changes, are received. If there are no current day or succeeding-day reconnaissance requirements, a negative report, which covers the appropriate time frame, will be disseminated. Amendments will be disseminated as required. During the month of November, the WSPOD will be disseminated as a NOTE added to the Tropical Cyclone Plan of the Day (TCPOD). Note: The WSPOD is disseminated under the header "MIAREPRPD" for AWIPS users and "NOUS42 KNHC" for N-TFS users. The WSPOD can be accessed via Internet at www.hurricanehunters.com/wx\_data.htm and clicking on Plan of the Day or via the Tropical Prediction Center/National Hurricane Center home page at www.nhc.noaa.gov--click on aircraft reconnaissance and then on Plan of the Day.

#### 2.4.5.4 Responsiveness.

- Notification of reconnaissance requirements should be made early enough to allow 16 hours plus en route flying time to the control point.
- The succeeding day outlook portion of the WSPOD is designed to allow advance notification.
- When circumstances do not allow the appropriate notification lead time, the mission will be levied as "resource permitting."

DATE				
TO:	CARCAH			
FROM:				
SUBJECT	`. ·	MISSION EVALUATION (MISSION IDENTIFIER)		
I.	PUBL	ISHED REQUIREMENTS		
	1.	CONTROL POINT AND TIME		
	2.	FLIGHT TRACK		
	3.	EXPIRATION TIME of REQUIREMENT		
	4.	MISCELLANEOUS (DROP PSNS, ALTITUDES, etc.)		
II.		NNAISSANCE MISSION PERFORMANCE		
	1.	CONTROL PT TIME: ON TIME LATE EARLY MISSED		
	2.	FLIGHT TRACK FLOWN:COMPLETELYPARTIALLYOTHER		
	3.	HORIZONTAL DATA COVERAGE: COMPLETE TIMELY ACCURATE  INCOMPLETE UNTIMELY INACCURATE		
	4.	VERTICAL DATA COVERAGE: COMPLETE TIMELY ACCURATE		
		INCOMPLETE UNTIMELY INACCURATE		
III.	OVER	ALL MISSION EVALUATION		
	OUTS	TANDING		
	UNSA	TISFACTORY FOR: COMPLETENESS ACCURACY TIMELINESS		
		EQUIPMENT PROCEDURES OTHER		
IV.	REMA	ARKS (BRIEF BUT SPECIFIC)		
V.	REPL	Y BY ENDORSEMENT YES NO		
		(Forecaster's Signature)		

Figure 2-1. Sample mission evaluation form.

1.	No flight is desired or previously requested flight is cancelled.
2.	A flight is requested.
	A. Track Number
	B. Control point and control point time
	C. Expiration time (at control point)
	D. Specific instructions (such as dropsonde positions)
3.	Succeeding day outlook.
	A. Negative
	B. Possible Track Number
	Control point and time
4. Coor	rdination (initials)
	NCEP/HPC 53 WRS
	AOC CARCAH
INSTRUCTIONS	S: Date and Time Fill in appropriate spaces as required. Pass a requests, changes, or cancellations to CARCAH immediately.

Figure 2-2. National Winter Storms Operations Plan Coordination Request.

FM:	CARCAH, NATIONAL HU	JRRICANE CENTER, MIAMI, FL
ТО:	(AFRC/NOAA APPROVEI	O ADDRESSEES)
SUB		E WINTER STORM PLAN OF THE DAY (WSPOD) (MONTH) TO Z (MONTH) (YEAR)(YR) -
1.	FLIGHT ONE	
	A	(TRACK/CONTROL POINT/TIME)
	В	(MISSION IDENTIFIER)
	C	(ESTIMATED DEPARTURE TIME)
	D	(DROPS REQUIRED/ADDED POSITIONS)
	E	(ALTITUDE/EXPIRATION TIME)
	F	(REMARKS, if needed)
2.	OUTLOOK FOR SUC	CCEEDING DAY
	A	(ANTICIPATED TRACK/CONTROL POINT/TIME)
	В	(REMARKS, if needed)
	Figure 2-3. Wint	ter Storm Plan of the Day (WSPOD) Format.

#### 2.5 Reconnaissance Flights.

#### 2.5.1 General Storm Tracks.

- **2.5.1.1 Mission Track/Flight Plan Names.** The nomenclature for winter storms aircraft reconnaissance is "Winter Storm Reconnaissance Program," and *the tracks are labeled Track 1-30 for tracks originating in Alaska, Track 31-60 for tracks originating in Hawaii, and Track 61-90 for Atlantic Ocean and Gulf of Mexico tracks. For example, a mission to be flown from Hawaii might be tasked as "Track 33."* The tracks are published in appendices to this document; they are also available from the OFCM, upon request from an authorized user.
- **2.5.1.2 ATC Communications Backup.** When 53 WRS or AOC flights are unable to contact ATC to request an en-route clearance, a clearance request may be relayed through the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) or the 53 WRS Mission Commander if the aircraft has the capability to communicate digitally through the satellite communications relay. This communications relay may only be used to preclude an emergency or safety-related situation. (See ATC Clearance procedures letter, Appendix C.)
- **2.5.1.3 Airborne Diversions.** Within operational limitations and with prior FAA Air Route Traffic Control Center (ARTCC) approval, airborne diversions deemed advisable by the airborne meteorologist may be made from these tracks.
- **2.5.1.4 Permanent Changes to Tracks.** Permanent changes to winter storm reconnaissance tracks must be coordinated with DOD, FAA, and DOC at least 30 days in advance of the implementation date.
- **2.5.2** Flight Plans. Flight plans for reconnaissance flights will be filed with the FAA as soon as practicable before departure time.
- **2.5.2.1 Prior Coordination**. The 53 WRS Mission Commander or the AOC Operations Division, as appropriate, will contact the FAA Central Altitude Reservation Function (CARF) at the Air Traffic Control System Command Center (ATCSCC) and, if appropriate, submit an Altitude Reservation Approval Request (ALTRV APREQ) at least 12 hours prior to an NWSOP mission. Individual exceptions may be made to the 12-hour requirement on a case-by-case basis through coordination between the 53 WRS, AOC, and CARF. Include the following information in the APREQ (see sample APREQ, Appendix D):
  - Mission call-sign.
  - Track name/identifier.
  - Estimated time over start ALTRV point.
  - Location of dropsonde release points.
  - Requested altitudes/flight levels.
  - Any special requests or deviations from published routes.

(Note: If the track to be flown is not a published storm track, the ALTRV APREQ shall be

submitted as far in advance as possible, in standard ALTRV format as specified in FAA Handbook 7610.4, Special Military Operations.)

- **2.5.2.1.1** The 53 WRS Mission Commander and the AOC Flight Operations Division will contact the National Operations Manager (NOM) at the ATCSCC as soon as possible prior to the NWSOP reconnaissance, surveillance, or research mission and provide the information specified in paragraph 2.5.2.1 (Prior Coordination) above. The ATCSCC will then coordinate this information with all FAA facilities impacted. In addition, the 53 WRS and/or AOC shall transmit via facsimile the information in Appendix E to the U.S. NOTAM office no later than 2 hours prior to departure or as soon as possible.
- **2.5.2.1.2** For Pacific Ocean NWSOP(WSRP-P) missions, 53 WRS or AOC officials may, upon receipt of tasking, coordinate directly with the affected ARTCC. An ALTRV APREQ may be submitted to CARF if the 53 WRS Mission Commander or the AOC Flight Operations Division deem it appropriate to increase the effectiveness of the flight planning process. When submitting an ALTRV APREQ, the procedures in paragraph 2.5.2.1 will be followed.
- **2.5.2.1.3** CARF will process the ALTRV APREQ and coordinate it with the impacted ATC facilities. The 53 WRS and AOC Project Officers shall coordinate with the agencies specified in FAA Order 7610.4, Special Military Operations, Chapter 3, Section 5, Originator Responsibilities.
- **2.5.2.1.4** Tracks flown in support of the NWSOP shall be defined in appendices to the plan. Changes, additions, and deletions to these tracks shall be coordinated between the 53 WRS, AOC, NOAA, and the FAA. These tracks shall be reviewed annually, no later than 1 June.
- **2.5.2.1.5** The 53 WRS shall only use the call sign "Teal ##," and AOC shall only use "NOAA ##." ATC will provide TEAL and NOAA aircraft priority handling when specifically requested.
- **2.5.2.1.6** For NWSOP missions, 53 WRS crews may request one of five "discreet" Mode 3 Beacon Codes, as issued by the Department of Defense (DOD) Code Manager.
- **2.5.3 Flight Levels.** *Tracks are planned and flown at the highest altitude feasible.* When operating under an Instrument Flight Regulation (IFR) flight plan, reconnaissance aircraft will fly only at Air Traffic Control (ATC) assigned altitudes and will accept altitude changes as directed by ATC.
- **2.5.4 Dropsonde Releases/Sensor Activations.** During NWSOP missions, when in other than Class G airspace, dropsonde instrument releases from FL 190 or higher and sensor activation shall be coordinated with the appropriate ATC by advising of a pending drop or sensor activation at least 10 minutes prior to the event when in direct radio contact with ATC. When contact with ATC is via Aeronautical Radio, Incorporated (ARINC), event coordination shall be included with the

position report prior to the point where the action will take place, unless all instrument release points have been previously relayed to the affected ATC center(s). EXAMPLE: "TEAL 63, SLATN at 1215, FL310, estimating FLANN at 1250. CHAMP next, Weather instrument release at FLANN."

- **2.5.4.1 Advisory Broadcasts**. During NWSOP missions, commencing 5 minutes prior to release of dropsondes from FL190 or higher, the aircraft commander will broadcast in the blind on 121.5 MHZ and 243.0 MHZ to advise any traffic in the area of the pending drop.
- **2.5.4.2 Aircraft Commander Responsibilities.** Aircraft commanders are the sole responsible party for all dropsonde releases or sensor activations. They are also responsible for determining the content and duration of a broadcast, concerning a dropsonde release or sensor activation.

#### 2.5.5 Air Traffic Control (ATC).

- **2.5.5.1 ATC Priority.** If mission requirements dictate, crews may specifically request "Priority Handling" from ATC in accordance with FAA Order 7110.65, Air Traffic Control, paragraph 2-1-4.1. (See ATC Clearance Letter, Appendix C).
- **2.5.5.2 ATC Separation.** The FAA will provide ATC services and separation from nonparticipating aircraft flying on instrument flight rules (IFR) to the 53 WRS and AOC aircraft operating in other than Class G airspace. Aircraft not flying on instrument flight rules may be operating near the storm environment; therefore, adherence to ATC clearances is mandatory for safety purposes.
- **2.5.5.2.1** It is the responsibility of the aircraft commander to remain clear of obstacles and nonparticipating aircraft when operating in Class G airspace.
- **2.5.5.2.2** The 53 WRS and AOC are responsible for ensuring that air traffic clearances and messages are relayed to/from the FAA in an accurate manner when those relays are initiated by the 53 WRS or AOC and are routed by some other means other than ARINC.
- **2.5.5.3 Assigned Altitudes.** When storm aircraft cannot maintain assigned altitudes due to turbulence, ATC should be advised. Normal vertical separation of 1000 feet at flight level (FL) 290 and below and 2000 feet above FL 290 will be provided by ATC to aircraft operating in the storm area. Unless otherwise coordinated with ATC, the altitudes between storm-mission aircraft may be used by ATC for nonparticipating aircraft.
- **2.5.5.4 Military Clearance.** For the east coast storms, the U.S. Navy through Commander in Chief, Atlantic Fleet Oceanic Aircraft Coordinator (CINCLANTFLT OAC) will review the WSPOD for each proposed flight to determine if clearance into a particular area will be required. Each mission will need to be coordinated with the regional controlling agencies for each warning area. The reconnaissance unit flying the mission will contact the appropriate clearance agencies prior to entry into any restricted airspace.

- **2.5.5.5** Coordination of Non-Standard Procedures. Any procedure desired by storm-mission commanders that is outside the above parameters must be coordinated with the appropriate ATC center.
- **2.5.6 Data Requirements.** Data will be coded and transmitted in standard reconnaissance code (RECCO) for flight level observations (Appendix J) or World Meteorological Organization upper-level pressure, temperature, humidity, and wind report from a dropsonde released by carrier balloons or aircraft (WMO TEMP DROP) format for dropsonde soundings (Appendix K). *The accuracy requirements for elements of the vertical sounding are as follows:*

• Pressure: within 2 hPa.

• Temperature: within 1°C.

• *Dew-point temperature:* 

From -20°C to +40°C: within l°C.

Less than -20°C: within 3°C.

• Wind direction: within 10 deg.

• Wind speed: within 5 kt.

**2.5.7 Mission Identifiers.** All weather messages will include the five-character agency/aircraft indicator, followed by the CARCAH-assigned mission indicator, followed by the track number. The five-character CARCAH-assigned mission indicator will consist of the sequential number of the mission being flown in the given basin, followed by the letters "WS" to signify a winter storm mission, followed by a location identifier based on the mission departure point—A= Atlantic, E= Eastern Pacific, and C= Central Pacific. Due to computer requirements for processing the data, there is no space between "Track" and the number signifying the track being flown.

#### --EXAMPLES--

AF984 03WSA TRACK64 (

(USAF aircraft 984 on the 3<sup>rd</sup> winter storm mission in the Atlantic basin flying track 64)

NOAA9 11WSC TRACK35

(NOAA aircraft 49RF on the 11<sup>th</sup> winter storm mission in the Central Pacific basin flying track 35)

#### **CHAPTER 3**

#### OTHER OBSERVATIONS

- **3.1** General. In addition to aerial reconnaissance data, the observational systems used in support of the *National Winter Storms Operations Plan* include land surface, ship, radar, buoy, upper air, and satellite data. The routine operations of these various data sources are detailed in the following Federal Meteorological Handbooks and plans:
  - Federal Meteorological Handbook No. 1, Surface Weather Observations and Reports
  - Federal Meteorological Handbook No. 2, Surface Synoptic Codes
  - Federal Meteorological Handbook No. 3, Rawinsonde and Pibal Observations
  - Federal Meteorological Handbook No. 11, Doppler Radar (Parts A, B, C, and D)
  - Operations of the National Weather Service
  - Federal Plan for Environmental Data Buoys
  - The GOES User's Guide and operational amendments
  - The NOAA Polar Orbiter Data Users Guide
  - National Operations Plan for Drifting Data Buoys
  - The Coastal Marine Automated Network (C-MAN) NWS Users Guide
  - Tide/Water Level Information Data and Evaluation System (TIDES) NWS Users Guide

Procedures for obtaining special or non-routine observations required in support of winter storm detection and forecasting, while covered to some extent in these documents, are described in detail in *National Weather Service Operations Manual*, Chapter B-90, "Special Warning Program Observations." The chapter covers observational programs of several agencies involved. The only two observational programs that will be covered in any detail here are the two data sources that provide unique capabilities to support winter storm analysis and forecasting.

#### 3.2 Satellite Observations.

3.2.1 Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Service (NESDIS).

3-axis stabilization for orbit control, GOES-12 at 75°W and GOES-10 at 135°W support the operational two-GOES constellation. Independent imager and sounder instruments eliminate the need to time share, yielding an increase in spatial coverage of image and sounder data at more frequent scanning intervals. The GOES also provides higher resolution and additional spectral channels than its predecessor, affording the hydrometeorological community improvements in detection, monitoring, and analysis of winter storms. From 135° W and 75° W, routine GOES satellite data coverage is extensive, stretching from the central Pacific through the Americas to the eastern Atlantic.

Routinely, each GOES schedule provides a view of the CONUS (GOES-10 view is termed PACUS) every 15 minutes. More frequent interval scans can be employed to support NOAA's warning programs, including the tracking of winter storms. Government agencies and the private sector have access to digital data transmissions directly from NOAAPORT or directly from GOES.

The current series of GOES satellites provide satellite data generated from full resolution, and imager and sounder data. Imagery at 1, 4, and 8 km resolution is available for daytime and nighttime applications. The increased resolution of the satellite imagery is a vast improvement from previous satellites. Visible data are available at 1 km resolution, "shortwave infrared" (channel 2 data) as well as the infrared channels 4 and 5 on GOES-10 are available at 4 km resolution, and water vapor data (channel 3) are available at 8 km resolution on GOES-10 and 4 km on GOES-12. Channel 2 data are valuable for the detection of low clouds, fog, stratus, and surface hot spots; channel 5 data available on GOES-10, in combination with data from channels 2 and/or 4, are useful for detecting volcanic ash in the atmosphere. On GOES-12, channel 5 is replaced by a new 13.3µm channel 6 that detects the presence of CO<sub>2</sub>. Channel 6 improves the measurement of the height of clouds and volcanic ash, thus improving computer model forecasts and ash warnings to the aviation community. The digital data may be enhanced to emphasize different features as desired. A suite of digital data and products is available to users in the National Weather Service (NWS), the National Environmental Satellite, Data, and Information Service (NESDIS), other Federal agencies, the academic community, and many private agencies, both national and international. These data are made available through NOAAPORT, McIDAS, the Internet, and other means such as local networks.

**3.2.1.1.1 GOES-12.** GOES-12, launched July 23, 2001, supports the GOES-East station at 75°W. Operations served include NOAA's HPC and WFOs, other Federal agencies, and the private sector. Various imager channels at higher resolutions are being utilized to monitor the intensification and movement winter storms. Retrievals from the GOES sounder are incorporated into NCEP's numerical models to improve model output. In addition, sounder data are being exploited to generate derived-product imagery; such as, total precipitable water, atmospheric stability indices, and surface and cloud temperatures.

- **3.2.1.1.2 GOES-9.** GOES-9, launched May 2, 1995, was replaced by GOES-10 as the operational satellite located at 135°W due to an imminent failure of GOES-9. While some momentum wheel problems exist on GOES-9, it remains capable of performing operations. GOES-9 replaced the Japanese Meteorological Agency's (JMA) GMS-5 over the west Pacific in mid-2003. The GMS-5 satellite has outlived its designed lifetime and has no fuel on board to maintain its inclination. JMA and NESDIS agreed to replace GMS-5 with GOES-9 to continue imagery over the Pacific Ocean as well as eastern Asia, Japan, and Australia. This was the first time sounder data from GOES was captured over much of the Pacific Ocean. GOES-9 will be retired on November 15, 2005 and will be replaced by JMA's MTSAT-1R satellite.
- **3.2.1.1.3 GOES-10.** GOES-10 was launched on April 24, 1997, and supports the GOES-West station at 135°W. The spacecraft carries the same specified imager and sounder instruments as GOES-9. GOES-10 was declared operational in July 1998 and was moved to 135°W. The routine scanning mode of GOES-10 provides coverage of the Northern and Southern Hemisphere eastern Pacific Ocean as well as the western United States. The GOES-West satellite also supports the missions of the HPC and WFOs, providing coverage of developing winter storms in the Pacific. The DOD and other Federal agencies are also supported.
- **3.2.1.1.4 GOES-11.** GOES-11 was launched on May 3, 2000. GOES-11 carries the same imager and instrumentation capabilities as GOES-10. GOES-11 is stored on orbit until required to replace either of the operational satellites.
- **3.2.1.1.5 GOES-N**. GOES-N is scheduled to be launched in mid-November 2005. GOES-N is a clone of GOES-12 and will be placed into storage until required to replace either of the operational satellites.
- 3.2.1.1.6 GOES Scan Operations. The spacecraft routinely scans the United States every 15 minutes. A full disk image is scanned every 3 hours and takes nearly 30 minutes to complete. Forecasters view digital GOES data more frequently and with greater spatial resolution. The digital data provide the user with the flexibility to customize gridding and enhancement curves for the data. The GOES spacecraft was also designed for flexible scanning of the earth. Any variation of scan or sector coverage at regular time intervals can be scheduled in a 30-minute time frame. Rapid Scan Operations (RSO) and Super-Rapid Scan Operations (SRSO) are available on the current generation of satellites. RSO and SRSO allow for small sections of the earth to be scanned more frequently, at up to 1-minute intervals; however, by doing so, other portions of the earth are scanned with less regularity. Definitions of the GOES RSO and SRSO scanning coverage and scanning times can be found at <a href="https://www.ssd.noaa.gov/PS/SATS/index.html">www.ssd.noaa.gov/PS/SATS/index.html</a>.
- **3.2.1.1.7 Requests for Special Satellite Sectors.** Special RSO and SRSO GOES data on critical severe storm days may be requested via the NCEP Senior Duty Meteorologist (SDM). The SDM will coordinate operational requests through the NESDIS Satellite Services Division (SSD), Satellite Analysis Branch (SAB). The details of these procedures are described in the NESDIS/NWS Satellite Schedule Coordination and Dissemination Procedures Plan, which is available on the SSD web site (*www.ssd.noaa.gov/PS/SATS/satops/*) for National Weather Services users and selected other users such as CIRA.

3.2.1.1.8 GOES Imager and Sounder. GOES-10 and GOES-12 host an imager capable of detecting atmospheric temperature and moisture measurements in five spectral bands at high resolutions, including the 3.9 $\mu$ m and 12.0 $\mu$ m (GOES-10) and 13.3 $\mu$ m (GOES-12) wavelengths. GOES-10 and GOES-12 also have the feature of transmitting these five spectral bands simultaneously, affording the user community continuous views of atmospheric measurements in various wavelengths, each with its own meteorological and hydrological applications. The five channels and respective resolutions are as follows:

- Channel 1 (Visible, 0.55 to 0.75 microns) 1 kilometer resolution
- Channel 2 (Infrared, 3.8 to 4.0 microns) 4 kilometer resolution
- Channel 3 (Water vapor, 6.5 to 7.0 microns) 8 kilometer (GOES-10), 4 kilometer (GOES-12)
- Channel 4 (Infrared, 10.2 to 11.2 microns) 4 kilometer resolution
- Channel 5 (Infrared, 11.5 to 12.5 microns) 4 kilometer (GOES-10 only)
- Channel 6 (Infrared, 13.0 to 13.7 microns) 8 kilometer (GOES-12 only)

The sounder on GOES-10 and GOES-12, consisting of 19 spectral channels, is used for measurements of atmospheric temperature and moisture profiles, surface and cloud-top temperature, and ozone distribution. Products derived from the sounder include precipitable water and the lifted index--a measure of atmospheric instability. Comparable to the imager, the sounder is capable of providing various scan coverages, such as full earth imagery, sectorized imagery, and local imagery. An independent sounder platform, governed under its own schedule, provides an expansion of sounder data coverage and an increase in the frequency of transmissions. GOES-10 and GOES-12 also carry vital subsystems; such as, the Solar X-Ray Imager (SXI), Space Environment Monitor (SEM), Data Collection System (DCS), Low Resolution Image Transmission (LRIT), and Search and Rescue (SAR) operations.

**3.2.1.1.9 GOES Products.** Under the NESDIS support concept, satellite imagery, in support of the National Winter Storms Operations Plan, is distributed by the Environmental Satellite Processing Center in Camp Springs, Maryland, to the national centers (NCEP), NWS Weather Forecast Field Offices (WFO), and to the Satellite Analysis Branch (SAB) and other NESDIS units. Data from the polar-orbiting satellites are available to SAB and the NCEP national centers.

NESDIS operates 24 hours a day to provide a myriad of satellite services and products to NCEP and NWS field sites. Internally at the NOAA Science Center, SAB meteorologists provide satellite interpretation and analyses to NCEP meteorologists, relating valuable information on present locations and intensities of winter storms, as well as the projected movement and development of these storms. In addition, snowfall estimates are derived from satellite signatures

and reported to NCEP and the WFOs to assist forecasters in determining fall rates and projected accumulations. As conditions warrant, winter storm precipitation analyses and estimates are disseminated to the appropriate WFOs and River Forecast Centers (RFC) across the United States.

All WFOs have access to the digital GOES data stream through AWIPS workstations. The satellite data feed to AWIPS/NOAAPORT is performed at the Satellite Central Data Distribution Facility in Camp Springs, MD. A large amount of satellite data are also available on a number of web site servers, both government operated and in the private sector.

The principal GOES-10 and GOES-12 products (see Table 3-1) are half-hourly pictures with navigation and calibration files included. During daylight hours, 1, 2, 4, and 8 kilometer resolution visible fixed standard sectors are produced for AWIPS/NOAAPORT distribution. Equivalent infrared sectors (4 kilometer), including water vapor (4 or 8 kilometer), for all available channels are available 24 hours a day. Satellite raw and remapped imagery, with navigation and calibration, is available to McIDAS users within the NWS and NESDIS community. Using the 3.9μm and 10.7μm channels together, a low-level cloud/fog product is produced, which the WFOs now use routinely.

#### 3.2.1.2 24-Hour Points of Contact.

- NCEP/NCO Senior Duty Forecaster (SDM)--301-763-8298
- NCEP/HPC Senior Branch Forecaster--301-763-8201
- NESDIS/SAB--301-763-8444

**3.2.1.3 NOAA Polar-Orbiting Satellites.** Two primary operational NOAA polar-orbiting satellites, NOAA-16 and NOAA-17, provide image coverage four times a day over a respective area in 6 spectral channels (only supports 5 channels at one time, with channel switching to support the 6<sup>th</sup> channel on NOAA-17). These satellites cross the U.S. twice per day at 12-hour intervals for each geographical area near the Equatorial crossing times listed in Table 3-1. NOAA-16 and NOAA-17 provide the same capabilities as previous NOAA satellites, except for the addition of an Advanced Microwave Sounder Unit (AMSU). Data are available via direct readout-high resolution picture transmission (HRPT) or automatic picture transmission (APT)--or via central processing. The Air Force Weather Agency (AFWA), Offutt AFB, NE, receives global NOAA imagery data direct from central readout sites on a pass-by-pass basis. The Command and Data Acquisition (CDA) stations at Fairbanks, AL, and Wallops, VA, acquire recorded global area coverage (GAC) data, and then route the data to NESDIS computer facilities in Suitland, MD, where the data are processed and distributed to NOAA, the DOD, and private-sector users.

**3.2.1.3.1 NOAA-15**. NOAA-15 is used as a backup satellite. While NOAA-15 continues to provide continuous imagery and products, their use is secondary to the operational uses of NOAA-16 and NOAA-17 imagery and products. Also, some users continued to need NOAA-15 data after NOAA-17 became operational. These data include sounder-based derived products like rain rate and total precipitable water. NOAA-15 is the backup morning satellite to NOAA-17.

**3.2.1.3.2 NOAA-16.** NOAA-16 was launched on September 21, 2000, and is in full operational use with the same capabilities as NOAA-15. NOAA-16 is the backup afternoon satellite to NOAA-18.

**3.2.1.3.3 NOAA-17.** NOAA-17, launched June 24, 2002, is in full operational use with the same capabilities as NOAA-15 and NOAA-16.

**3.2.1.3.4 NOAA-18.** NOAA-18, launched on February 24, 2005, is in full operational use with the same capabilities as NOAA-17.

#### 3.2.2 Department of Defense (DOD) Defense Meteorological Satellite Program (DMSP).

The DMSP constellation consists of at least three spacecraft placed in sun-synchronous orbits best suited to support military operations. In addition to the very high resolution visible and infrared imagery, DMSP provides a variety of remotely sensed terrestrial and space environmental data. A suite of microwave radiometers provides microwave imagery as well as surface characteristics and upper air temperature and moisture soundings. The DMSP data capabilities in the area of concern are provided in Table 3-1. Special requests for DMSP support will be addressed to CARCAH.

Table 3-1. Satellites and Satellite Data Availability for the National Winter Storms Operations Plan.

#### **Geosynchronous Orbit**

SATELLITE	TYPE OF DATA	LOCAL TIME	REMARKS
GOES-12 at 75°W	Multispectral Imager	Every 30 minutes, in Routine Scan Mode, provides	1. 1, 2, 4, and 8 km visible standard sectors.
GOES-10 at 135°W	and Sounder	3 sectors with prescribed coverages: Northern Hemisphere (NH) or Extended NH, CONUS or	<ul><li>2. 4 km equivalent resolution IR sectors.</li><li>3. Equivalent and full resolution IR enhanced</li></ul>
GOES-10 at 155 W	5 channels for the	PACUS, and Southern Hemisphere (SH).	imagery.
GOES-11 at 108°W	Imager		4. Full disk IR imagery every 3 hours.
(on orbit storage for	19 channels for the	Exception is transmission of a full disk every 3	5. 8 km resolution water vapor sectors.
GOES-10 or GOES- 12)	Sounder	hours.	6. Quantitative precipitation estimates, high density cloud and water vapor motion wind vectors, and
12)	Sounder	Available Rapid Scan Operations (RSO) yield	experimental visible and sounder winds.
GOES-9 at 165°E		increased transmissions to 7.5 minute intervals to	7. Operational moisture sounder data (precipitable
(supporting JMA)		capture rapidly changing, dynamic weather events.	water) in four levels for inclusion in NCEP numerica models. Other sounder products include: gradient
			winds, vertical temperature and moisture profiles,
			mid-level winds, and derived product imagery
			(precipitable water, lifted index, and surface skin
			temperature. 8. Tropical storm monitoring and derivation of
			intensity analysis.
			9. Volcanic ash monitoring and dissemination of
			volcanic ash advisory statements.
			<ul><li>10. Daily Northern Hemisphere snow cover analysis.</li><li>11. Twice daily fire and smoke analysis over specific</li></ul>
			areas within CONUS.

Table 3-1 (con't). Satellites and Satellite Data Availability for the National Winter Storms Operations Plan.

**Polar Orbiting** 

SATELLITE	TYPE OF DATA	LOCAL TIME	REMARKS
			1. 1 k m resolution HRPT/ Local Area Coverage (LAC) data.
NOAA-18	AVHRR: GAC and LAC (recorded), HRPT and APT	0152D/1352A	<ol> <li>4 km resolution APT/ Global Area Coverage (GAC) data.</li> <li>Mapped imagery.</li> </ol>
NOAA-17	(direct readout) AMSU and HIRS	1025D/2225A	4. Unmapped imagery (all data types) at DMSP sites.
NOAA-16	AMSU and HIKS	0225D/1425A	<ul><li>5. Sea-surface analysis.</li><li>6. Soundings.</li></ul>
NOAA-15		0620D/1820A	<ul><li>7. Moisture profiles.</li><li>8. Remapped GAC sectors.</li></ul>
			<ol> <li>Sounding-derived products: total precipitable water, rain rate, and surface winds under sounding (NOAA-15).</li> </ol>
			10. Daily northern hemisphere snow cover analysis
DMSP F-13	OLS Imagery (recorded and direct), SSM/I	0632D/1832A	<ul> <li>11. Twice daily fire and smoke analysis over specific areas within CONUS</li> <li>1. 0.3 nm (regional) and 1.5 nm (global) resolution (visual and infrared) imagery available via stored data recovery through AFWA.</li> <li>2. Regional coverage at 0.3 nm and 1.5 nm (visual and infrared) imagery</li> </ul>
DMSP F-14	OLS Imagery (recorded and direct), SSM/I	0635D/1835A	available from numerous DOD tactical terminals.  3. DMSP data available from AFWA.
DMSP F-15	OLS Imagery (recorded and direct), SSM/I	0840D/2040A	
DMSP F-16	OLS Imagery (recorded and	0813D/2013A	
	direct), SSMIS, SSM/T-1 and SSM/T-2	Note: Times are accurate to +/- 5 minutes	

<sup>\*</sup> Local time/equatorial crossing time/D = Daylight descending/A = Daylight ascending

#### 3.3 Automated Coastal Marine and Ocean Observations.

#### 3.3.1 Moored Data Buoys and Coastal Marine Automated Network.

- **3.3.1.1 Procedures.** Moored buoy and Coastal Marine Automated Network (C-MAN) stations routinely acquire and transmit data every hour. Buoy observations include wind direction, speed, and peak 5-second wind; sea level pressure; air temperature; dew point temperature; sea surface temperature; significant wave height and dominant wave period; and wave energy spectra. Descriptions of the measurements from a typical moored buoy and C-MAN station are provided in Tables 3-2 and 3-3, respectively. Consult NDBC's web page at <a href="https://www.ndbc.noaa.gov">www.ndbc.noaa.gov</a> to view the station locations, latest station operating status, and for site-specific information.
- **3.3.1.2 Communications.** Data are transmitted by ultra-high frequency (UHF) communications via NOAA's GOES system to NESDIS, then relayed to the National Weather Service Telecommunications Gateway (NWSTG) for processing, including real-time quality control, and dissemination. *A few buoys also transmit observations through the Iridium satellites.* Data from moored buoys are distributed in World Meteorological Organization (WMO) FM13-IX SHIP code. C-MAN observations are distributed in CMAN code which is a modified form of FM12-IX SYNOP code.
- **3.3.1.3 Point of Contact (Daytime).** The NDBC Data Analyst can be reached at 228-688-3134.

#### 3.3.2 Drifting Data Buoys.

- **3.3.2.1 Procedures.** These buoys are deployed by ship or aircraft in data sparse areas. Their movement depends upon ocean currents and winds. Data available include position; sea level pressure; wind speed and direction; air temperature; and sea surface temperature. Although NWS does not routinely deploy drifting buoys, several are deployed each year in the North Pacific by Meteorological Service of Canada and their observations are available in real time.
- **3.3.2.2 Communications.** Data are transmitted by UHF communications via NOAA polar-orbiting satellites to NESDIS ground receiving stations and then relayed to the U.S. Argos Global Processing Center in Largo, Maryland. Following processing and limited quality control at Service Argos, the observations are sent on to the NWSTG for dissemination. Drifting buoy observations are in FM18-IX BUOY code format.

Table 3-2. Moored buoy payload data.

PARAMETER	REPORTING RANGE	REPORTING RESOLUTION	SAMPLE INTERVAL	SAMPLE PERIOD	TOTAL SYSTEM ACCURACY
WIND SPEED	0 TO 62 m/s	0.1 m/s	18	8-10 min	±1 m/s or 10%
WIND DIRECTION	0 TO 360°	۰	18	8-10 min	±10°
PEAK WIND	0 TO 82 m/s	1 m/s	18	8-10 min	±1 m/s or 10%
AIR TEMPERATURE	-40 TO 50 °C	0.1 °C	s 06	8-10 min	±1 °C
BAROMETRIC PRESSURE	800 TO 1100 hPa	0.1 hPa	4 s	8-10 min	±1 hPa
SURFACE WATER TEMPERATURE	-7 TO 41 °C	0.1 °C	18	8-10 min	±1 °C
SIGNIFICANT WAVE HEIGHT	0 TO 35 m	0.1 m	0.39 s	20 min	±0.2 m or 5%
WAVE PERIOD	3 TO 30 s	0.1 s	0.39 s	20 min	±1 s
NONDIRECTIONAL WAVE SPECTRA	0.03 TO 0.40 Hz	0.01 Hz	0.39 s	20 min	l
SOLAR RADIATION*	0 TO 2150 W/m <sup>2</sup>	$0.5 \text{ W/m}^2$	1 s	8-10 min	<b>∓</b> 2%
<b>DEW POINT TEMPERATURE*</b>	-35 TO 30 °C	0.1 °C	1 s	8-10 min	±1 °C
PRECIPITATION RATE (ORG)*	0.5 TO 1600 mm/hr	1 mm	15 s	15 min	<b>∓</b> 5%
DIRECTIONAL WAVES*	0.03 TO 0.35 Hz	0.01 Hz	0.5 s	20 min	±5°
HORIZONTAL OCEAN CURRENTS (ADCP)*	OCP)* 0 TO 1000 cm/s	0.5 cm/s	1.5 s	20 min	±2 cm/s

\*PARAMETER REPORTED ON SELECTED BUOYS

Table 3-3. Data from a typical fixed C-MAN station.

S				AVERAGING	
	REPORTED DATA	REPORTING RANGE	REPORTING RESOLUTION	PERIOD (SELECTABLE)	TOTAL SYSTEM ACCURACY
WIND DIRECTION TRUI	TRUE WIND DIRECTION	0° – 360°	1.0°	2 min	±15° TRUE (±10° DESIRED)
WIND SPEED AVG	AVG. WIND SPEED	0 – 120 kn	1.0 kn	2 min	±2.0 kn or 5%
PEA	PEAK WIND GUST	0 – 160 kn	1.0 kn	(SELECTABLE)	±2.0 kn or 5%
WAVES SIGN HEIG	SIGNIFICANT WAVE HEIGHT (H <sub>.,,</sub> )	0 – 49 m	0.5 m	(SELECTABLE)	0.5 m
WAV	WAVE PERIOD (T)	2.5-5s	s t	(SELECTABLE)	±1 s
PRO	PROBABLE MAXIMUM WAVE HEIGHT	0 – 49 m	0.5 m	(SELECTABLE)	0.5 m
BAROMETRIC SEA PRESSURE	SEA LEVEL PRESSURE	900 – 1100 hPa	0.2 hPa	2 min	±1.0 hPa ABSOLUTE
AIR TEMPERATURE AIR	AIR TEMPERATURE	-40 to +50 °C	0.1 °C	1 min	±1.0 °c
SEA SURFACE SEA TEMPERATURE* TEM	SEA SURFACE TEMPERATURE	-6 to +40 °C	0.5 °C	lmin	±1.0 °c
DEW POINT DEW	DEW POINT	-35 to +30 °C	0.5 °C	1 min	-35 to -24 °C: ±2 °C
TEM	TEMPERATURE				-23.5 to -1.5°C: ±1.5 °C -1.5 to +30 °C: ±1.0 °C
SECTOR VISIBILITY VISI	VISIBILITY RANGE	0 – 8 statute mi		2 min	0 to 3 mi: ±10% 3 to 8 mi: ±1 mi
WATER LEVEL WAT	WATER LEVEL	0 – 99.99 ft	0.01 ft	(PERIODICALLY RESET TO ZERO)	TBD
PRECIPITATION CUN	CUMULATIVE PRECIPITATION	0 – 999 mm	1 mm	(PERIODICALLY RESET TO ZERO)	±1 mm or 4%

### **CHAPTER 4**

### **COMMUNICATIONS**

### 4.1 <u>Department of Commerce</u>.

- **4.1.1 National Weather Service (NWS).** All communication systems of the NWS are used in support of the data collection and warning program given in the plan (see Table 4.1). These communication systems are described in the publication, *Operations of the National Weather Service*.
- **4.1.2 Aircraft Operations Center (AOC).** The AOC may use the communications facilities of the Air Force described in Paragraphs 4.2.1 and 4.2.2.

### 4.2 <u>Department of Defense (DOD)</u>.

- **4.2.1** U.S. Air Force. Headquarters Air Force Weather Agency (AFWA) posts winter storm bulletins received from the National Weather Service on the Joint Air Force/Army Weather Information Network (JAAWIN) where they are accessible by DOD users worldwide.
- **4.2.2 Weather Reconnaissance.** Weather reconnaissance observations will be transmitted via satellite down link, checked for accuracy, and then *transmitted to NOAA and AFWA for processing.* When the aircraft-to-satellite data link is inoperative, observations will be transmitted using high frequency single sideband radio to CARCAH. A summary of reconnaissance communications capabilities by organization is listed in Table 4.1.
- **4.2.3 U.S. Navy.** For the maritime environment, the primary means of dissemination for gale, storm, high-seas warnings, other winter storm advisories, and special observations is via the classified and unclassified web pages of the Naval Meteorology and Oceanography Center, Norfolk, VA, for the Atlantic and Mediterranean basins (https://www.nlmoc.navy.(smil).mil) and the Naval Meteorology and Oceanography Center, Pearl Harbor, HI for the Pacific and Indian Ocean basins (https://www.npmoc.navy.(smil).mil). Both graphical and alphanumeric warnings are posted. In addition, the Defense Message Service (DMS) is also used to distribute alphanumeric data and gale, storm, and high-seas graphics. Unclassified DISN ATM Services (DATMS-U) will be used for exchange of data between National Weather Service (NWS) and the Navy's Fleet Numerical Meteorology and Oceanography Center.
- **4.3** <u>U.S. Coast Guard</u>. The Coast Guard operates activities that routinely collect and/or report meteorological data. Those units that collect and transmit (or report) data for this program are Coast Guard Communications facilities at Boston, MA; Chesapeake, VA; Miami, FL; New Orleans, LA; Kodiak, AK; Honolulu, HI; and San Francisco, CA. These facilities collect Automated Mutual Assistance Vessel Rescue (AMVER) messages from merchant vessels and METEO messages from merchant and Coast Guard vessels on a routine basis. The METEO data are then passed directly to the NCEP on the Coast Guard Data Network (CGDN).

Table 4-1. Reconnaissance organization contact information.

STATION	ADDRESS	TELEPHONE
Federal Coordinator for Meteorology (OFCM)	Suite 1500 8455 Colesville Rd. Silver Spring, MD 20910	DSN 851-1460 301-427-2002
CARCAH	National Hurricane Center 11691 SW 17th Street Miami, FL 33165-2149	DSN 434-3420 305-229-4474
National Hurricane Center	11691 SW 17th Street Miami, FL 33165-2149	305-229-4470
Alternate National Hurricane Center	NCEP/HPC Camp Springs, MD	301-763-8201
Central Pacific Hurricane Center	P.O. Box 29879 Honolulu, HI	808-973-5284
Naval Meteorology and Oceanography Center, Norfolk	NMOC 9141 Third Avenue Norfolk, VA 23511-2394	DSN 564-7750 757-444-7750
Naval Meteorology and Oceanography Center, Pearl Harbor	NMOC 425 Luapele Road Pearl Harbor, HI 96860-3104	DSN 471-0004 808-471-0004
Aircraft Operations Center	AOC Tampa, FL	813-828-3310
Air Force Weather Agency	AFWA Offutt AFB, NE	DSN 271-2586 402-294-2586
FACSFAC VACAPES OAC	FACSFAC VACAPES, Oceana, VA	DSN 433-1233 757-433-1233
53 WRS	53 WRS 817 H Street - Suite 201 Keesler AFB, MS 39534-2453	DSN 597-5518/2409 601-377-5518/2409

### **CHAPTER 5**

### **PUBLICITY**

- **5.1** <u>News Media Releases.</u> News media releases, other than warnings and advisories, for the purpose of informing the public of the operational and research activities of the Departments of Commerce, Defense, and Transportation should reflect the joint effort of these agencies by giving due credit to the participation of other agencies.
- **5.2 <u>Distribution.</u>** Copies of these releases, along with any pertinent pictures, should be forwarded to the following agencies:
  - NOAA Office of Public Affairs
     Herbert C. Hoover Building
     14th and Constitution Avenue, N.W.
     Washington, DC 20230
  - Commander, Naval Meteorology and Oceanography Command 1020 Balch Boulevard
     Stennis Space Center, MS 39529-5005
  - Hq Air Force Reserve Command (AFRC/PA) Robins AFB, GA 31093
  - Joint Staff Weather Officer
     The Joint Chiefs of Staff (J-3/DDGO-ROD)
     Pentagon Room 2D-921G
     Washington, DC 20318-3000
  - Federal Aviation Administration (APA-300) 800 Independence Avenue, S.W. Washington, DC 20591
  - Federal Coordinator for Meteorology Suite 1500, 8455 Colesville Road Silver Spring, MD 20910

### APPENDIX A

### **ABBREVIATIONS**

### -A-

AF Air Force (U.S. Air Force)

AFB Air Force Base

AFRC Air Force Reserve Command

AFTN Aeronautical Fixed Telecommunications Network

AFW Air Force Weather

AFWA Air Force Weather Agency

A/G Air to Ground

AIRMET Airmen's Meteorological Information Bulletin

AIREP Aircraft Report

ALTRV APREQ Altitude Reservation Approval Request
AMSU Advanced Microwave Sounding Unit
AMVER Automated Mutual Assistance Vessel

AOC Aircraft Operations Center
APT Automatic Picture Transmission
ARINC Aeronautical Radio, Incorporated
ARTCC Air Route Traffic Control Center

ATC Air Traffic Control

AVHRR Advanced Very High Resolution Radiometer
AWIPS Advanced Weather Interactive Processing System

**-C-**

C Celsius

CA Commander, Atlantic Area (USCG)

CARCAH Chief, Aerial Reconnaissance Coordination,

All Hurricanes

CARF Central Altitude Reservations Function

CDA Command and Data Acquisition CCGD Commander, Coast Guard District

CG Coast Guard

CINCLANTFLT Commander-in-Chief, Atlantic Fleet C-MAN Coastal Marine Automated Network

CONUS Continental United States
Class G Airspace Uncontrolled airspace

DA Daylight Ascending

DATMS-U DISN ATM Services

DCS Data Collection System

DMS Defense Message Service

DMSP Defense Meteorological Satellite Program

DOC Department of Commerce
DOD Department of Defense
DOT Department of Transportation

DRSR Direct Readout Scanning Radiometer
DSN Defense Switched Network (AUTOVON)

DTG Date Time Group

-E-

ESA European Space Agency
ETA Estimated Time of Arrival
ETD Estimated Time of Departure

-F-

FAA Federal Aviation Administration FAD Force Activity Designator

FCMSSR Federal Committee for Meteorological Services

and Supporting Research

FL Flight Level

FNDL Fleet Numerical Meteorology and Oceanography Center/

National Centers for Environmental Prediction Data Link

ft Foot, Feet

FSS Flight Service Station

FTS Federal Telecommunications System

-G-

GAC Global Area Coverage

GCCS Global Command and Control System (USAF)

GDSS Global Decision Support System

GMS Geostationary Meteorological Satellite

GOES Geostationary Operational Environmental Satellite

-H-

HF High Frequency

HIRS High-Resolution Infrared Radiation Sounder

hr Hour

HPC Hydrometeorological Prediction Center (NCEP)

HQ AMCHeadquarters, Air Mobility CommandHRPTHigh Resolution Picture Transmission

-I-

ICAO International Civil Aviation Organization

ICMSSR Interdepartmental Committee for Meteorological

Services and Supporting Research

IFR Instrument Flight Rules

-J-

JAAWIN Joint Air Force/Army Weather Information Network

JCS Joint Chiefs of Staff

JMA Japanese Meteorological Agency

JMCIS Joint Maritime Command Information System

JP Joint Publication

-K-

km Kilometer(s) kPa Kilopascal kt Knot(s)

-L-

LAC Local Area Coverage

LF Light Fine

-M-

m meter(s)

M-3 METEOSAT-3
mb millibar(s)--see kPa
METEO Cable Address for Ships

METOC Meteorology and Oceanography

mi (statute) mile(s) min minute(s)

MIST Meteorological Instrument Standard Terminal

mph mile(s) per hour

MSD Meteorological Services Division

m/s meter(s) per second

NASA
National Aeronautics and Space Administration
NAVMETOCCOM
NAVMETOCCOMDET
Naval Meteorology and Oceanography Command
Naval Meteorology and Oceanography Command

Detachment

NAVMETOCCOMFAC Naval Meteorology and Oceanography Command Facility

NAWAS National Warning System

NCEP National Centers for Environmental Prediction

NDBC National Data Buoy Center

NESDIS National Environmental Satellite, Data,

and Information Service

NHC National Hurricane Center

nm nautical mile(s)

NMOC
Naval Meteorology and Oceanography Center
NOAA
National Oceanic and Atmospheric Administration
NSSL
National Severe Storms Laboratory (NOAA)

NWSTG National Weather Service Telecommunications Gateway

**-O-**

OAC Oceanic Aircraft Coordinator (USN)

OFCM Office of the Federal Coordinator for Meteorology

OLS Operational Line Scan System
ONR Office of Naval Research
OSV Ocean Station Vessel

-P-

Pa Pascal

PIREP Pilot Report

-R-

RAREP Radar Report

RECCO Reconnaissance Code
RFC River Forecast Center
RSO Rapid Scan Operations

-S-

SAB Satellite Analysis Branch

SAR Search and Rescue

SARLANT Search and Rescue Atlantic Circuit

SCAT Satellite Cloudtop and Tropopause
SDM Senior Duty Meteorologist (NCEP)
SEM Space Environmental Monitor
SGDB Satellite Global Database

SIGMET Significant Meteorological Information

SSB Single Sideband SSC Stennis Space Center

SSM/I Special Sensor Microwave/Imagery

SSMIS Special Sensor Microwave Imager Sounder
SSM/T-1 Special Sensor Microwave/Temperature
SSM/T-2 Special Sensor Microwave/Water Vapor

SRSO Super-Rapid Scan Operations

SXI Solar X-Ray Imager

-T-

TEAL Call Sign for State Operated Reconnaissance Aircraft

TESS Tactical Environmental Support System TOVS TIROS-N Operational Vertical Sounder

TPC Tropical Prediction Center

-U-

UHF Ultra High Frequency

UND Urgency of Need Designator

USA United States Army
USAF United States Air Force
USCG United States Coast Guard

USN United States Navy

UTC Universal Coordinated Time (Z)

-V-

VAS VISSR Atmospheric Sounder

VISSR Visible and Infrared Spin Scan Radiometer

-W-

WBC Identifier for NCEP
WEFAX Weather Facsimile
WG Working Group

WG/HWSOR Working Group for Hurricane and Winter

Storms Operations and Research (OFCM)

WFO Weather Forecast Office

WMO World Meteorological Organization

A-5

WRS Weather Reconnaissance Squadron
WS Weather Squadron (USAF)
WSFO Weather Service Forecast Office
WSO Weather Service Office
WSPOD Winter Storm Plan of the Day

-X-

XADC Extended Atlantic Data Coverage

**-Z**-

Z Zulu Time (UTC)

### APPENDIX B

### DEFINITIONS

- **Area of Concern.** The geographic area of concern for the *National Winter Storms Operations Plan* covers the Gulf of Mexico and extends about 150 miles inland along the U.S. Gulf Coast. In the Atlantic, the area of concern ranges from latitudes 259N to 489N, west of longitude 559W, extending about 150 miles inland along the eastern coast of the United States. It also includes the North Pacific Ocean east of the international date line
- **Blizzard Warning.** The NWS issues a Blizzard Warning to notify the public when blizzard conditions (sustained wind or frequent gusts of 35 mph or more accompanied by falling and/or blowing snow, frequently reducing visibility less than one-fourth mile for three hours or more) are occurring, imminent, or have a high probability of occurrence within the next 36 hours.
- **Due Regard.** Operation wherein state operated aircraft assume responsibility for separation from all other aircraft without ATC assistance.
- **Freezing Rain (or Drizzle).** Rain or drizzle that falls in liquid form but freezes upon impact with the ground or exposed objects. Small accumulations of ice can cause driving and walking difficulties while heavy accumulations produce extremely dangerous and damaging situations primarily by pulling down trees and utility lines.
- **Heavy Snow Warning.** The NWS issues a Heavy Snow Warning to notify the public when heavy snow (four inches or more accumulation in 12 hours or six or more inches accumulation in 24 hours in most areas of the country, but some variation in the snowfall criterion is allowable on a regional basis) is occurring, imminent, or has a high probability of occurrence within the next 36 hours
- **Ice Storm Warning.** NWS issues an Ice Storm Warning to notify the public when significant ice accumulations (generally one-quarter inch or greater, but some variation in the ice accumulation criterion is allowable on a regional basis) are occurring, imminent, or have a high probability of occurrence within the next 36 hours and no other predominate winter weather element is expected to occur.
- **Mission Identifier.** The nomenclature assigned to winter storm aircraft reconnaissance missions for weather data identification. It comprises an agency-aircraft indicator followed by a CARCAH-assigned mission-system indicator.
- **Reconnaissance Aircraft Sortie.** A flight that meets the requirements of the winter storm plan of the day.

- **Sleet.** Sleet is a type of precipitation consisting of transparent or translucent pellets of ice, 5 mm or less in diameter. These pellets of ice usually bounce when hitting hard ground and make a sound upon impact. Heavy sleet is a relatively rare event defined as an accumulation of ice pellets covering the ground to a depth of ½ inch or more.
- **Winter Storm Outlook.** This product <u>may be issued</u> when there is a good chance of a major winter storm beyond the point normally covered by a watch. The intent of an outlook is to provide information to those who need considerable lead time to prepare for the event.
- Winter Storm Plan of the Day. A coordinated mission plan that tasks operational weather reconnaissance requirements during the next 1100Z to 1100Z day; describes reconnaissance flights committed to satisfy operational requirements and identifies possible reconnaissance requirements for the succeeding 24-hour period.
- **Winter Storm Warning.** The NWS issues a Winter Storm Warning to notify the public when more than one predominate winter weather hazard (i.e., heavy snow and blowing snow, snow and ice, snow and sleet, sleet and ice, or snow, sleet and ice) is occurring, imminent, or has a very high probability of occurrence within the next 36 hours and is expected to meet or exceed locally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements
- Winter Storm Watch. The NWS issues a Winter Storm Watch when conditions are favorable for a hazardous winter weather event to develop in the next 12 to 48 hours, but its occurrence, location; and/or timing is uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so. The watch will cover the possible occurrence of the following elements, either separately or in combination: heavy snow, significant accumulations of freezing rain, and/or heavy sleet. Some event specific watches are issued when only one predominate winter weather hazard is expected. The event specific watches are: Blizzard Watch, Lake Effect Snow Watch, and Wind Chill Watch.
- Winter Weather Advisories. Event-specific advisories are used to describe conditions that do not constitute a serious enough hazard to warrant a warning for the general public but; nevertheless, pose a significant threat to specified users. They are highlighted in forecasts and statements. These types of advisories include snow, blowing snow, lake effect snow, wind chill, and freezing rain.

### APPENDIX C

### DEPARTMENT OF THE AIR FORCE UNITED STATES AIR FORCE RESERVE COMMAND

5 December 2005

#### MEMORANDUM FOR CARCAH

FROM: 53 WRS/DON (228) 377-2929 (Lt Col Stanton)

SUBJECT: Air Traffic Control Clearances

CARCAH (alternate CARCAH/53WRS Operations) is authorized to relay Air Traffic Control (ATC) clearances to 53WRS aircraft using satellite communications (SATCOM). References for this authority are the Federal Aviation Administration/Air Force Reserve (FAA/AFRC) Memorandum of Agreement, SUBJECT: METEOROLOGICAL RECONNAISSANCE FLIGHTS, and the National Hurricane Operations Plan, paragraph 5.5.4 entitled Air Traffic Control Clearances.

### PROCEDURES:

- 1. Alternative method to acquire a clearance when aircrew is unable to contact Air Traffic Control
  - o Air Crews will send a SATCOM message to CARCAH and will provide the following information: present position and altitude/flight level, estimate to next navigation checkpoint and route of flight/altitude desired. Include any additional pertinent information. Use the following format:

Please contact Houston ARTCC with the following clearance request: TEAL 40 PRESENTLY AT 25N 97W, ESTIMATE COKER 1430Z, LEVEL FIVE THOUSAND FT RQST DCT DOLPH DCT LEV DCT BIX, FL180.

NOTE: If mission conditions warrant, crews may request Priority Handling. Use the following format:

TEAL 40 PRESENTLY OVER LULIS FL180B190. RQST DCT 25N 92W, THEN FLT PLN RTE ROST PRIORITY HANDLING DUE TO NHOP MISSION TIMING TO HURRICANE FIRPO.

o CARCAH will contact the appropriate ATC Center (see attachment for phone numbers) and speak to the Oceanic Supervisor (primary) or Military Missions Coordinator (secondary). Calls to these numbers are generally automatically recorded. When the clearance is issued to CARCAH, CARCAH must transmit the clearance to the aircraft <u>verbatim</u>, since it may differ from the requested clearance. CARCAH <u>must</u> preface the clearance with the words, "ATC clears..." such as in the example:

ATC CLEARS TEAL 40 TO KEESLER AFB VIA DIRECT COKER DIRECT DOLPH DIRECT LEV DIRECT. CLIMB AND MAINTAIN FL180. CONTACT HOUSTON CENTER ON 123.4 CROSSING 26 DEGREES NORTH.

- 2. Clearances Relay Request from ATC
  - o ATC Centers may contact CARCAH (305-229-4474) or alternate CARCAH/53WRS Operations (228) 377-2409 to request a message relay to a TEAL aircraft. CARCAH will then relay the message or clearance, as appropriate.

//signed//
ROBERT J. STANTON, Lt Col, USAF
Airspace Manager

Attachment: ATC Phone Numbers

# AIR TRAFFIC CONTROL PHONE NUMBERS

	OCEANIC SUPERVISOR	MISSIONS COORDINATOR
ANCHORAGE	(907) 269-1108 FAX (907) 269-1343	
BOSTON ARTCC	N/A	(603) 879-6666 (DSN 881-1635)
HONOLULU ARTCC	(808) 739-7600 FAX (808) 739-7604	(808) 739-7605
HOUSTON ARTCC	(281) 230-5552 FAX (281) 230-5561	(281) 230-5563 (DSN 885-1491)
JACKSONVILLE ARTCC	(904) 549-1549 (GULF OF MEXICO) FAX (904) 549-1843	(904)549-1542 (DSN 434-3744)
	-1547 (ATLANTIC, S. OF JAX, All Altitudes) -1546 (ATLANTIC, N. OF JAX, FL240/BELOW)	
	-1545 (ATLANTIC, N. OF JAX, PL240/BEEOW)	
OAKLAND ARTCC	(501) 745-3342 / 3000 (SWITCHBOARD) FAX (510) 745-3411	(510) 745-3334 (DSN 730-1595)
MIAMI ARTCC	(305) 716-1781 (GULF OF MEXICO) FAX (305) 716-1511	(305) 716-1589 (DSN 434-1910)
	(305) 716-1784 (ATLANTIC)	
	(305) 716-1784 (BAHAMAS & SOUTH)	
	(305) 716-1782 (BAHAMAS & NORTH)	
NEW YORK ARTCC	(631) 468-1496	(516) 468-1429 (DSN 881-3730)
NA DOO G	(0.00) (0.0 40.50 F.4.37 (0.00) (0.0 45.00	FAX (631) 468-1428
PIARCO Control	(868) 669-4852 FAX (868) 669-4529	(868) 669-4806 (Chief Controller)
SAN JUAN ARTCC WASHINGTON ARTCC	(787) 253-8664/8665 FAX (787) 253-8685 N/A	(787) 253-8650 (Weekdays only) (703) 771-3472 (DSN 937-1420)
WASHINGTON ARTCC	IV/A	FAX (703) 771-3590
		,
ATC CHOTTLY COLOURS		
ATC SYSTEM COMMAND CENTER		(703) 904-4525
CENTER		(703) 304-4323
CARF		(703) 904-4426 (DSN 725-3331)

### APPENDIX D

# DEPARTMENT OF THE AIR FORCE UNITED STATES AIR FORCE RESERVE COMMAND

5 December 2005

MEMORANDUM FOR FAA/CARF

FROM: 53 WRS/DON

SUBJECT: Altitude Reservation Approval Request

ALTRV APREQ CORONET COAST 04

- A. TEAL 02
- B. WC130/I
- C. KBIX
- D. ((PR FL250 [ALTRV BEGINS] SIE 0000 DCT CLMB FL290B310 PREPI 0015 OWENZ 0020 LVLOFF BY BERGH 0030 A300 CHAMP 0050 G437 MERCI 0120 A700 [3240N 7436W 0205] TROUT 0250 AR5 DINNS 0405 [ALTRV ENDS] IFPFP
- E. KBIX
- F. ETD ALTRV BEGINS OVER SIE AT 29 NOV/2245Z. AVANA 2345Z
- G. TAS 250KTS/300KTS

PROJECT OFFICER: MAJ MADDOX DSN 597-5518 ALTERNATE PROJECT OFFICER: LT COL STANTON DSN 597-2929

ADDITIONAL INFORMATION: WX RECON MISSION IN SUPPORT OF NWS AND NWSOP. DROPSONDE RELEASE POINTS OWENZ CHAMP MERCI 3240N 7436W TROUT. AIRCREW WILL ADJUST AIRSPEED TO REACH CONTROL POINT MERCI AT 30 NOV/0000Z PLUS/MINUS 30 MINUTES. THE FOLLOWING IFPFP ROUTINGS ARE FOR INFO ONLY AND DO NOT CONSTITUTE AN ATC CLRNC OR PART OF THIS ALTRV REQ: KBIX DCT SJI J37 SPA DCT RDU J209 TYI DCT SWL DCT SIE (ALTRV). REQ: JA DCT TAY J2 SJI DCT BIX LAND (KBIX). NOTE: AFTER CROSSING 3240N 7436W CREW MAY BE RELEASED AND WILL END ALTRV AND REQ CLRNC TO KBIX. REQ ALTRV APVL FAX TO (601) 377-1923.

ROBERT J. STANTON, Lt Col, USAFR Airspace Manager

**SAMPLE** 

**SAMPLE** 

(ROUTING MAY BE INCORRECT)
(USE AS REFERENCE FOR FORMAT ONLY - SEE FAA Handbook 7610.4)

### APPENDIX E

# FORMAT FOR NHOP/NWSOP FLIGHT INFORMATION FOR INTERNATIONAL AND DOMESTIC NOTAM ISSUANCE

Flight information shall be sent to the NOTAM office via facsimile to (703) 904-4437 for dissemination as an International and Domestic NOTAM in the following format (Note: The request is made for a "Domestic NOTAM," which will then automatically makes its way into the international NOTAM system):

# Header **Request a Domestic NOTAM be Issued**

- A. Affected Center(s). This field will include all affected ARTCCs in 3-letter identifier format; e.g., ZNY, ZOA, ZAN. Synoptic track flights will probably utilize more than one ARTCC, and any adjacent ARTCC should be included when the flight track is within 100 miles of the adjacent center's airspace. Flights that are flying in the storm environment will utilize the ARTCC whose airspace is mostly affected.
- B. **Start Time (YYMMDDZZZZ)**. For example, 0006011600. This time would correspond to the entry time on a reconnaissance track or time at the storm fix latitude/longitude.
- C. **Ending Time (YYMMDDZZZZ)**. This would be the completion time of reconnaissance track or the time exiting the storm environment.
- E.\* **Text**. This field is free form and should include the following information: route of flight for the <u>mission portion</u> (latitude/longitude, fixes, airways), type of activity (laser, dropsonde, etc.), frequency/location of deployment, broadcast frequencies, any other pertinent information that may concern other flights.
- F. **Lower Altitude (during mission)**. Use "Surface" since the dropsonde is the "reason" for the NOTAM as much or more so than the aircraft altitude.
- G. Upper Altitude (during mission). For example, FL450.

If only one altitude is to be used, then F and G may be combined. If altitude is going to vary throughout the mission, utilize "see text" and the information can be inserted there and the altitudes may be explained in field E.

\* Note that there is no paragraph "D". It is reserved for FAA use.

### NOTES:

- 1. Include a unit/agency phone number and point of contact for possible questions from the NOTAM office
- 2. Only ICAO approved contractions may be used.
- 3. Using this format will help ensure timely and accurate information dissemination.

### **ATTENTION**

Flight track information is not available for online distribution, so Appendix F –Atlantic and Gulf of Mexico Flight Tracks, Appendix G – Alaskan Flight Tracks, and Appendix H – Hawaiian Flight Tracks are not available in this document.

An additional note: the flight tracks have not been updated or changed from the printed edition of the 2004 National Winter Storms Operations Plan.

If you have any question, please contact the OFCM at 301-427-2002 or via email ofcm.mail@noaa.gov.

### APPENDIX I

### OFFICIAL INTERAGENCY AGREEMENTS

The following enclosure is the Memorandum of Agreement (MOA) between the Air Force Reserve Command (AFRC) and the National Oceanic and Atmospheric Administration (NOAA), October 12, 2000. The purpose of this agreement is to establish policies, principles, and procedures under which the AFRC and NOAA provide aircraft weather reconnaissance in support of the *National Hurricane Operations Plan* and the *National Winter Storms Operations Plan*.

### MEMORANDUM OF AGREEMENT

### **BETWEEN**

### THE UNITED STATES AIR FORCE RESERVE COMMAND

### **AND**

### THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PURPOSE: The National Oceanic and Atmospheric Administration (NOAA), an agency of the Department of Commerce, does not have the capability to fully support all operational requirements in support of tropical cyclone and winter storm aerial reconnaissance. This memorandum of agreement establishes policies, principles, and procedures under which the Air Force Reserve Command (AFRC) will provide aircraft weather reconnaissance support to NOAA. NOAA and AFRC enters into this agreement pursuant to its authority under 15 U.S.C. 313.

### 1. REFERENCES:

- a. National Hurricane Operations Plan (NHOP)
- b. National Winter Storms Operations Plan (NWSOP)
- c. Department of Defense Appropriations Act, 2000
- 2. <u>BACKGROUND</u>: The Air Force Reserve Command (AFRC) maintains 10 WC-130s to meet the Department of Commerce (DOC) aircraft reconnaissance requirements. AFRC will conduct up to five (5) sorties per day in support of NHOP requirements and up to two (2) sorties per day in support of NWSOP requirements. The Department of Defense (DOD), through AFRC, will bear all costs directly attributed to providing aircraft weather reconnaissance support. Support will be limited to the number of AFRC congressionally funded aircraft flying hours per year.
  - a. Total flying hours used to support the weather reconnaissance mission are set annually in the DOD Appropriations Act. The 53rd Weather Reconnaissance Squadron (53 WRS) manages the flying hour program.
  - b. The operational area for AFRC weather reconnaissance includes the Atlantic Ocean, Gulf of Mexico, the Caribbean Sea, and the North Pacific Ocean east of the international date line, as outlined in the NHOP and the NWSOP.
  - c. The 53 WRS will be capable of operating from two (2) deployed locations, as well as from home station, simultaneously, supporting a maximum of five tropical cyclone

sorties per day or two winter storm sorties per day.

3. <u>IMPLEMENTATION</u>: Implementation details are contained in "GENERAL PROVISIONS."

### 4. GENERAL PROVISIONS:

- a. AFRC agrees:
  - 1) Within the limits of military capability, to meet NOAA's requirements for aerial weather reconnaissance in accordance with the NHOP and NWSOP.
  - 2) To provide at the Tropical Prediction Center/National Hurricane Center (TPC/NHC) the staff and equipment required to support the mission of the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH). CARCAH provides 24-hour telecon/aircraft SATCOM operational interface between NOAA/TPC/NHC and AFRC/53WRS for NHOP and NWSOP taskings. CARCAH is a subunit of and reports directly to the 53WRS.
- b. NOAA agrees to promptly notify AFRC/53WRS of the requirements for tropical cyclone or winter storm mission taskings in accordance with the NHOP and the NWSOP. Tropical cyclone missions will be tasked by the Director, TPC/NHC. Winter storm missions will be tasked by the Director, National Centers for Environmental Prediction.
- c. AFRC recognizes the obligation to support winter storm operations and associated research projects as delineated by the DOD Appropriations Act and the NWSOP. Support to research projects will be contingent upon aircraft availability.
- 5. <u>MOBILIZATION</u>: In times of national emergency or war, some or all AFRC/53WRS reconnaissance resources may not be available to fulfill DOC/NOAA needs.
- 6. <u>EFFECTIVE AND TERMINATION DATES</u>: This memorandum will become effective on the date signed by the last approving official. The parties will review this memorandum of agreement at least once every three years to determine whether it should be revised, amended, or cancelled. Amendments or revisions to this agreement require the mutual consents of the parties.

### 7. COORDINATION:

The agency contacts for coordination of the activities under this MOU are:

<u>AOC</u>: CAPT Robert W. Maxson, NOAA, Aircraft Operations Center, DOC, MacDill AFB, Florida; phone: (813) 828-3310 ext. 3001; fax: (813) 828-3266 E-mail Bob.W.Maxson@NOAA.gov

Ms. Julie Robertson, (813) 828-3310 ext. 3010; fax: (813) 828-8923 E-mail Julie.A.Robertson@NOAA.gov

### AFRC:

HQ AFRC/DOOX

DSN 497-1161; Commercial (228)327-1161

403 WG/XPL

SSgt Clarence Hester Jr., Logistics Plans Manager

Keesler AFB, MS

DSN 597-3521; Commercial (228) 377-3521

Fax DSN 597-4624; Commercial (228) 377-3521

Email: Clarence.Hester@keesler.af.mil

**53 WRS** 

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### 8. RESOLUTION OF DISAGREEMENTS

Nothing herein is intended to conflict with current DOC or the NOAA Aircraft Operations Center directives. If the terms of this agreement are inconsistent with existing directives of either of the agencies entering into this agreement, then those portions of this agreement which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of the agreement, all necessary changes will be accomplished either by an amendment to this agreement or by entering into a new agreement, whichever is deemed expedient to the interest of both parties.

Should disagreement arise on the interpretation of the provisions of this agreement, or amendments and/or revisions thereto, that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each party and presented to the other party for consideration. If agreement on interpretation is not reached within thirty (30) days, the parties shall forward the written presentation of the disagreement to respective higher officials for appropriate resolution.

FOR THE UNITED STATES AIR FORCE RESERVE COMMAND FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

RWM SXSM Capt NOAA

Date: 10/12/2000

# APPENDIX J RECCO FORM, CODE TABLES AND REGULATIONS

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Figure J-1. Reconnaissance code recording form.

### Table J-1. Reconnaissance code tables.

### TABLE 1 XXX

- Sec One Observation without radar capability
- Sec Three (intermediate) observation 555 with or without radar capability
- Sec One Observation with radar capability

### $\underline{\mathsf{TABLE}\,2}\ i_d$

- No dew point capability/acft below 10.000 meters
- No dew point capability/acft at or above 10,000 meters
- No dew point capability/acft below 10,000 meters and flight lvl tem -509C or colder
- No dew point capability/acft at or above 10,000 meters and flight lvl temp -509C or colder
- Dew point capability/acft below 10,000
- Dew point capability/acft at or above 10,000 meters
- Dew point capability/acft below 10,000 meters and flight lvl temp -509C or
- Dew point capability/acft at or above 10,000 meters and flight lvl temp -509C or colder

#### TABLE 3 O

	TBEE 5	
0	09-909W	Northern
1	909W - 1809	Northern
2	1809 - 909 E	Northern
3	909-09E	Northern
4	Not Used	
5	09 - 909 W	Southern
6	909W - 1809	Southern
7	1809 - 909 E	Southern
8	909-09E	Southern

### TABLE 4 B

- None
- Light turbulence
- Moderate turbulence in clear air, infrequent
- Moderate turbulence in clear air, frequent
- Moderate turbulence in cloud, infrequent
- Moderate turbulence in cloud, frequent
- Severe Turbulence in clear air, infrequent Severe Turbulence in clear air, frequent
- Severe Turbulence in cloud, infrequent
- Severe Turbulence in cloud, frequent

### TABLE 5 f<sub>c</sub>

- In the clear
- In and out of clouds
- In clouds all the time (continuous IMC)
- Impossible to determine due to darkness or other cause

### TABLE 6 d<sub>t</sub>

- Spot of Wind
- Average wind
- No wind reported

### TABLE 7 da

- Winds obtained using doppler radar or inertial systems
- Winds obtained using other navigation equipment and/or techniques
- Navigator unable to determine or wind not compatible

#### TABLE 8 w

- Clear
- Scattered (trace to 4/8 cloud coverage)
- Broken (5/8 to 7/8 cloud coverage)
- Overcast/undercast
- 4 Fog, thick dust or haze
- Drizzle
- 6 Rain (continuous or intermittent precip from stratiform clouds)
- Snow or rain and snow mixed
- Shower(s) (continuous or intermittent precip - from cumuliform clouds)
- Thunderstorm(s)
- Unknown for any cause, including

#### TABLE 9 i

- Sea level pressure in whole millibars (thousands fig if any omitted)
- Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted)
- Altitude 850 mb surface in geopotential meters (thousands fig omitted)
- Altitude 700 mb surface in geopotential meters (thousands fig omitted)
- Altitude 500 mb surface in geopotential decameters
- Altitude 400 mb surface in geopotential decameters Altitude 300 mb surface in geopotential
- decameters Altitude 250 mb surface in geopotential
- decameters (thousands fig if any omitted) D - Value in geopotential decameters; if
- negative 500 is added to HHH
- Altitude 925 mb surface in geopotential
- No absolute altitude available or geopotential data not within " 30 meters/4 mb accuracy requirements

### TABLE 10 N<sub>s</sub>

- No additional cloud layers (place holder)
- 1 okta or less, but not zero
- (1/8 or less sky covered)
- 2 oktas (or 2/8 of sky covered)
- 3 oktas (or 3/8 of sky covered)
- 4 oktas (or 4/8 of sky covered)
- 5 5 oktas (or 5/8 of sky covered)
- 6 oktas (or 6/8 of sky covered)
- 7 oktas or more but not 8 oktas
- 8 oktas or sky completely covered
- Sky obscured (place holder)

#### TABLE 11 C

- Cirrus (Ci)
- Cirrocumulus (Cc)
- Cirrostratus (Cs)
- Altocumulus (Ac)
- Altostratus (As)
- Nimbostratus (Ns)
- Stratocumulus (Sc)
- Stratus (St) Cumulus (Cu)
- Cumulonimbus (Cb)
- Cloud type unknown due to darkness or other analogous phenomena

### TABLE 12 h<sub>s</sub>h<sub>s</sub>H<sub>t</sub>H<sub>t</sub>h<sub>i</sub>h<sub>i</sub>H<sub>i</sub>H

- Less than 100 100 ft
- 01 02 200 ft
- 03 300 ft
- etc, etc
- 4,900 ft 49
- 50 5,000 ft Not used
- 56 6,000 ft
- 57 7,000 ft
- etc. etc 79
- 29,000 ft 80 30,000 ft
- 81 35,000 ft
- 82 40,000 ft etc, etc
- Greater than 70,000 ft 89 Unknown

### TABLE 13 d<sub>w</sub>

- 5 SW No report 6 W NE 2 Е 7 NW 3 SE 8 N
- 4 S 9 all directions

### TABLE 14 W<sub>c</sub>

- No change
- Marked wind shift
- Beginning or ending or marked turbulence
- Marked temperature change (not with altitude)
- Precipitation begins or ends
- Change in cloud forms
- Fog or ice fog bank begins or ends
- Warm front
- Cold Front
- Front, type not specified

### TABLE 15 SbSeSs

- No report
- Previous position
- Present position
- 30 nautical miles
- 60 nautical miles
- 90 nautical miles
- 120 nautical miles
- 150 nautical miles 180 nautical miles
- More than 180 nautical miles
- Unknown (not used for S<sub>s</sub>)

### Table J-1. Reconnaissance code tables (continued)

### TABLE 16 w<sub>d</sub>

- No report
- Signs of a tropical cyclone
- Ugly threatening sky
- Duststorm or sandstorm
- Fog or ice fog
- Waterspout
- Cirrostratus shield or bank
- Altostratus or altocumulus shield or bank
- Line of heavy cumulus
- Cumulonimbus heads or thunderstorms

### TABLE 17 I<sub>r</sub>

- Light
- Moderate
- Severe
- Unknown or contrails

### TABLE 18 L

- None
- Rime ice in clouds
- Clear ice in clouds
- Combination rime and clear ice in
- Rime ice in precipitation
- Clear ice in precipitation
- Combination rime and clear ice in precip
- Frost (icing in clear air)
- Nonpersistent contrails (less than 1/4 nautical miles long)
- Persistent contrails

# $\begin{array}{ccc} \underline{\text{TABLE 19}} & S_{r,} E_{w,} E_{l} \\ 0 & \text{0NM} & 5 & \text{50NM} \end{array}$

- - 6 60-80NM
- 1 10NM 2 20NM
  - 7 80-100NM
- 3 30NM 4 40NM
- 8 100-150NM 9 Greater than 150NM
  - / Unknown

### TABLE 20 Oe

- 0 Circular
- 1 NNE SSW
- 2 NE SW
- 3 ENE-WSW
- 4 E-W
- 5 ESE WNW 6 SE - NW
- 7 SSE NNW
- 8 S-N
- / Unknown

### TABLE 21 c<sub>e</sub>

- 1 Scattered Area
- 2 Solid Area
- 3 Scattered Line
- 4 Solid Line
- 5 Scattered, all quadrants
- 6 Solid, all quadrants
- / Unknown

### TABLE 22 i<sub>e</sub>

- 2 Weak
- 5 Moderate
- 8 Strong / Unknown

### TABLE 23 Vi

- 1 Inflight visibility 0 to and including 1 nautical mile
- 2 Inflight visibility greater than 1 and not exceeding 3 nautical miles
- 3 Inflight visibility greater than 3 nautical miles

### RECCO SYMBOLIC FORM

SECTION ONE (MANDATORY)

$$9XXX9\: GGggi_{\mathbf{d}}\: YQL_{\mathbf{a}}L_{\mathbf{a}}L_{\mathbf{a}}L_{\mathbf{0}}L_{\mathbf{0}}L_{\mathbf{0}}Bf_{\mathbf{c}}\: h_{\mathbf{a}}h_{\mathbf{a}}h_{\mathbf{a}}d_{\mathbf{t}}d_{\mathbf{a}}$$

ddfff TTT<sub>d</sub>T<sub>d</sub>w /jHHH

SECTION TWO (ADDITIONAL)

$$1k_nN_sN_sN_s$$
  $Ch_sh_sH_tH_t$  ..... 4ddff

$$6W_sS_sW_dd_w$$
  $7I_rI_tS_bS_e$   $7h_ih_iH_iH_i$   $8d_rd_rS_rO_e$ 

$$8E_wE_lc_ei_e$$
  $9V_iT_wT_wT_w$ 

SECTION THREE (INTERMEDIATE)

 $9XXX9\,GGggi_{\mathbf{d}}\,YQL_{\mathbf{a}}L_{\mathbf{a}}L_{\mathbf{a}}\,\,L_{\mathbf{o}}L_{\mathbf{o}}L_{\mathbf{o}}Bf_{\mathbf{c}}\,\,h_{\mathbf{a}}h_{\mathbf{a}}h_{\mathbf{a}}d_{\mathbf{t}}d_{\mathbf{a}}$ 

ddfff TTT<sub>d</sub>T<sub>d</sub>w /jHHH

### Table J-2. Reconnaissance code regulations.

- 1. At the time of the observation the aircraft observing platform is considered to be located on the axis of a right vertical cylinder with a radius of 30 nautical miles bounded by the earth's surface and the top atmosphere. Present weather, cloud amount and type, turbulence, and other subjective elements are reported as occurring within the cylinder. Flight level winds, temperature, dew point, and geopotential values are sensed or computed and reported as occurring at the center of the observation circle. Radar echoes, significant weather changes, distant weather, and icing are phenomena that may also be observed/reported. Code groups identifying these phenomena may be reported as necessary to adequately describe met conditions observed.
- 2. The intermediate observation (Section Three) is reported following Section One (or Section Two if appended to Section One) in the order that it was taken.
- 3. Plain language remarks may be added as appropriate. These remarks follow the last encoded portion of the horizontal or vertical observation and will clearly convey the intended message. Vertical observations will not include meteorological remarks. These remarks must begin with a letter or word-e.g. "FL TEMP" vice "700 MB FL TEMP." The last report plain language remarks are mandatory, i.e., "LAST REPORT. OBS 01 thru 08 to KNHC, OBS 09 and 10 to KBIX."
- 4. The hundreds digit of longitude is omitted for longitudes from 1009 to 1809.
- 5. Describe conditions along the route of flight actually experienced at flight level by aircraft.
- 6. TT,  $T_dT_d$ . When encoding negative temperatures, 50 is added to the absolute value of the temperature with the hundreds figure, if any, being omitted. A temperature of -529C is encoded as 02, the distinction between -529C and 29C being made from  $i_d$ . Missing or unknown temperatures are reported as //. When the dew point is colder than -49.49C, Code  $T_dT_d$  as // and report the actual value as a plain language remark e.g. "DEW POINT NEG 529C".
- 7. When two or more types of w co-exist, the type with the higher code figure will be reported. Code Figure 1, 2 and 3 are reported based on the total cloud amount through a given altitude, above or below the aircraft, and when other figures are inappropriate. The summation principle applies only when two or more cloud types share a given altitude.

- 8. When j is reported as a /, HHH is encoded as ///.
- 9. If the number of cloud layers reported exceeds 3, k<sub>n</sub> in the first 1-group reports the total number of cloud layers. The second 1-group reports the additional number of layers being reported exclusive of those previously reported. In those cases where a cloud layer(s) is discernible, but a descriptive cloud picture of the observation circle is not possible, use appropriate remarks such as "Clouds Blo" or "As Blo" to indicate the presence of clouds. In such cases, coded entries are not made for group 9. The sequence in which cloud amounts are encoded depends upon type of cloud, cloud base, and vertical extent of the cloud. The cloud with the largest numerical value of cloud type code (C) is reported first, regardless of coverage, base, or vertical extent. Among clouds of the same cloud type code, sharing a common base, the cloud of greatest vertical extent is reported first. The summation principle is not used; each layer is treated as though no other clouds were present. The total amount of clouds through one altitude shared by several clouds will not exceed 8 oktas. Only use code figure 0 as a place holder when you can determine that no additional cloud layers exist. In case of undercast, overcast, etc., use code figure 9 as a placeholder.
- 10. Due to limitations in the ability to distinguish sea state features representative of wind speeds above 130 knots, surface wind speeds in excess of 130 knots will not be encoded. Wind speeds of 100 to 130 knots inclusive will be encoded by deleting the hundreds figure and adding 50 to dd. For wind speeds above 130 knots, dd is reported without adding 50 and ff is encoded as // with a plain language remark added, i.e., "SFC WIND ABOVE 130 KNOTS."
- 11. Significant weather changes which have occurred since the last observation along the track are reported for  $W_S$
- 12. When aircraft encounters icing in level flight, the height at which the icing occurred will be reported for  $h_i$ . The  $H_iH_i$  will be reported as //.

### APPENDIX K

### **TEMP DROP CODE**

### EXTRACT FROM: WMO-No. 306 MANUAL ON CODES

FM 37-IX Ext. TEMP DROP - Upper-level pressure, temperature, humidity and wind report from a sonde released by carrier balloons or aircraft. Figure E-1 is an example TEMP DROP message.

### **CODE FORM:**

### PART ALPHA (A)

**XXAA** – Identifier for a temp drop code

### DATE/TIME GROUP: YYGGI<sub>d</sub>

• Identifier: YY – Date Group

• Identifier: GG – Time Group

• Identifier: I<sub>d</sub> - The highest mandatory level for which wind is available

### LATITUDE: 99L<sub>a</sub>L<sub>a</sub>L<sub>a</sub>

• Identifier: 99 – Indicator for data on position follows

• Identifier:  $L_aL_aL_a$  – Latitude in tenths of degrees

### LONGITUDE: QcLoLoLoLo

• Identifier: Q<sub>c</sub> – The octant of the globe

• Identifier:  $L_0L_0L_0L_0$  – Longitude in tenths of degrees

### MARSDEN SQUARE: MMMUlaUlo

• Identifier and explain: MMM – Marsden square

• Identifier and explain: U<sub>la</sub>U<sub>lo</sub> – Units digits in the reported latitude and longitude

### SEA LEVEL PRESSURE: 99P<sub>o</sub>P<sub>o</sub>P<sub>o</sub> T<sub>o</sub>T<sub>o</sub>T<sub>o</sub>D<sub>o</sub>D<sub>o</sub> d<sub>o</sub>d<sub>o</sub>f<sub>o</sub>f<sub>o</sub>f<sub>o</sub>

• Identifier: 99 – Indicator for data at the surface level follows

- Identifier:  $P_oP_oP_o$  Indicator for pressure of specified levels in whole millibar (thousands digit omitted)
- Identifier:  $T_oT_oT_o$  Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface
- Identifier: D<sub>o</sub>D<sub>o</sub> Dewpoint depression at standard isobaric surfaces beginning with surface level

### **NOTE**

When the depression is  $4.9^{\circ}\text{C}$  or less encode the units and tenths digits of the depression. Encode depressions of  $5.0^{\circ}\text{C}$  through  $5.4^{\circ}\text{C}$  as 50. Encode depressions of  $5.5^{\circ}\text{C}$  through  $5.9^{\circ}\text{C}$  as 56. Dewpoint depressions of 6.0 and above are encoded in tens and units with 50 added. Dew-point depressions for relative humidity less then 20 percent are encoded as 80. When air temperature is below  $-40^{\circ}\text{C}$  report  $D_aD_a$  as //.

- Identifier: d<sub>o</sub>d<sub>o</sub> True direction from which the wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit (0 and 5) is added to the hundreds digit of wind.
- Identifier:  $f_0 f_0 f_0$  Wind speed in knots. Hundreds digit is sum of hundreds digit of speed and unit digit of direction. Example: 295 degrees at 125 knots is encoded as 29625.

### STANDARD ISOBARIC SURFACES: P<sub>1</sub>P<sub>1</sub>h<sub>1</sub>h<sub>1</sub>h<sub>1</sub> T<sub>1</sub>T<sub>1</sub>T<sub>1</sub>D<sub>1</sub>D<sub>1</sub> d<sub>1</sub>d<sub>1</sub>f<sub>1</sub>f<sub>1</sub>f<sub>1</sub>

- Identifier:  $P_1P_1$  Pressure of standard isobaric surfaces in units of tens of millibars. (1000mbs = 00, 925mbs = 92, 850mbs = 85, 700mbs = 70, 500mbs = 50, 400mbs = 40, 300mbs = 30, 250mbs = 25)
- Identifier: h<sub>1</sub>h<sub>1</sub>h<sub>1</sub> Heights of the standard pressure level in geopotential meters or decameters above the surface. Encoded in decameters at and above 500mbs omitting, if necessary, the thousands or tens of thousands digits. Add 500 to hhh for negative 1000mb or 925mb heights. Report 1000mb group as 00/// ///// when pressure is less than 950mbs.
- Identifier:  $T_1T_1T_1D_1D_1$  Same temperature/dew point encoding procedures apply to all levels
- Identifier:  $d_1d_1f_1f_1 Same$  wind encoding procedures apply to all levels

### DATA FOR TROPOPAUSE LEVELS: 88P<sub>n</sub>P<sub>n</sub>P<sub>n</sub> T<sub>n</sub>T<sub>n</sub>T<sub>n</sub>D<sub>n</sub>D<sub>n</sub> d<sub>n</sub>d<sub>n</sub>f<sub>n</sub>f<sub>n</sub>f<sub>n</sub>

- Identifier: 88 Indicator for Tropopause level follows
- Identifier:  $P_nP_nP_n$  Pressure at the tropopause level reported in whole millibars. Report  $88P_nP_nP_n$  as 88999 when tropopause is not observed
- Identifier:  $T_n T_n T_n D_n D_n$  Same temperature/dew point encoding procedures apply
- Identifier:  $d_n d_n f_n f_n f_n$  Same wind encoding procedures apply

### MAXIMUM WIND DATA: 77P<sub>n</sub>P<sub>n</sub>P<sub>n</sub> d<sub>n</sub>d<sub>n</sub>f<sub>n</sub>f<sub>n</sub>f<sub>n</sub> 4v<sub>b</sub>v<sub>b</sub>v<sub>a</sub>v<sub>a</sub>

- Identifier: 77 Indicator that data for maximum wind level and for vertical wind shear follow when max wind does not coincide at flight. If the maximum wind level coincides with flight level encode as 66
- Identifier:  $d_n d_n f_n f_n S$ ame wind encoding procedures apply
- Identifier: 4 Data for vertical wind shear follow
- Identifier:  $v_b v_b$  Absolute value of vector difference between max wind and wind 3000 feet BELOW the level of max wind, reported to the nearest knot. Use "//" if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure "99."

• Identifier:  $v_a v_a$  – Absolute value of vector difference between max wind and wind 3000 feet ABOVE the level of max wind, reported to the nearest knot. Use "//" if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure "99."

# SOUNDING SYSTEM IDENTIFIER, RADIOSONDE/SYSTEM STATUS, LAUNCH TIME: 31313 $s_r r_a r_a s_a s_a$ 8GGgg

- Identifier:  $s_r$  Solar and infrared radiation correction (0 no correction)
- Identifier: r<sub>a</sub>r<sub>a</sub> Radiosonde/sounding system used (96 Descending radiosonde)
- Identifier:  $s_a s_a$  Tracking technique/status of system used (08 Automatic satellite navigation)
- Identifier: 8GGgg Launch time
- Identifier: 8 Indicator group
- Identifier: GG Time in hours
- Identifier: gg Time in minutes

### ADDITIONAL DATA GROUPS: 51515 101XX 0P<sub>n</sub>P<sub>n</sub>P<sub>n</sub>P<sub>n</sub>

- Identifier: 51515 Additional data in regional code follow.
- Identifier: 10166 Geopotential data are doubtful between the following levels  $0P_nP_nP_n$ . This code figure is used only when geopotential data are doubtful from one level to another.
- Identifier: 10167 Temperature data are doubtful between the following levels  $0P_nP_nP_nP_n$ . This code figure shall be reported when only the temperature data are doubtful for a portion of the descent. If a 10167 group is reported a 10166 will also be reported. EXAMPLE: Temperature is doubtful from 540mbs to 510mbs. SLP is 1020mbs. The additional data groups would be: 51515 10166 00251 10167 05451.
- Identifier: 10190 Extrapolated altitude data follows:
  - a. When the sounding begins within 25mbs below a standard surface, the height of the surface is reported in the format  $10190 \, P_n P_n h_n h_n h_n$ . The temperature group is not reported. EXAMPLE: Assume the release was made from 310mbs and the 300mb height was 966 decameters. The last reported standard level in Part A is the 400mb level. The data for the 300mb level is reported in Part A and B as 10190 30966.
  - b. When the sounding does not reach surface, but terminates within 25mbs of a standard surface, the height of the standard surface is reported in Part A of the code in standard format and also at the end of Part A and Part B of the code in the format as 10190 P<sub>n</sub>P<sub>n</sub>h<sub>n</sub>h<sub>n</sub>h<sub>n</sub>. EXAMPLE: Assume termination occurred as 980mbs and the extrapolated height of the 1000mb level was 115 meters. The 1000mb level would be reported in Part A of the code as 00115 ///// ///// and in Part B as 10190 0015.
- Identifier: 10191 Extrapolated surface pressure follows. Extrapolated surface pressure is only reported when the termination occurs between 850mb and the surface. Surface pressure is reported in Part A as 99P<sub>o</sub>P<sub>o</sub>P<sub>o</sub> ///// and in Part B as 00P<sub>o</sub>P<sub>o</sub>P<sub>o</sub> /////. When surface pressure is extrapolated the 10191 group is the last additional data group reported in Part B.

### AIRCRAFT AND MISSION IDENTIFICATION: 61616 AFXXX XXWSX TRACK XX OB XX

- Identifier: 61616 Aircraft and mission identification data follows
- Identifier: AFXXX The identifier AF for U.S. Air Force and the last three digits of the aircraft's tail number
- Identifier: XXWSX The identifier for the number and type of mission being flown and the basin of flight origination.
  - a. XX defines the number of winter storm flights flown.
  - b. WS identifies the flight as a winter storm reconnaissance mission.
  - c. If the flight originated in the Atlantic basin the last letter would be an 'A". The letter "C" identifies the Central Pacific area and the letter "E" identifies the Eastern Pacific.
- Identifier: Track XX The winter storm track tasked
- Identifier: OB XX The observation (both vertical and horizontal) number as transmitted from the aircraft.

### **NOTE**

All non-tasked flights will utilize the same training flight identifiers.

**NATIONALLY DEVELOPED CODES: 62626** National practice group indicator preceding a free form character string containing specific sonde or mission-related remarks. Remarks include:

- SPL XXXXNXXXXXW Impact location of the sonde based on its last GPS position.
- XXXX Splash time in the format hhmm
- MBL WND dddff The mean wind in the lowest 500 meters of the sounding.
- LAST WND XXX Height of the last reported wind. If a surface wind is reported, the Last Wind remark is omitted. XXX will never be less than 13 meters.
- AEV XXXXX This is the software version being used for the sounding.
- DLM WND ddfff bbbttt the average wind over the depth of the sounding. Where ddfff is the wind averaged from the first to the last available wind (these would correspond to the first and last significant levels for wind); ttt is the pressure at the top of the layer, and bbb is the pressure at the bottom of the layer (in whole mbs, with thousands digit omitted).
- WL150 ddfff zzz Average wind over the lowest available 150 m of the wind sounding. Where ddfff is the mean wind over the 150 m layer centered at zzz m.

### **CODE FORM:**

### PART BRAVO (B)

**XXBB** – Identifier for a temp drop code

### **Date/Time Group: YYGG8**

- Identifier: YY Date Group
- Identifier: GG Time Group
- Identifier: 8 Indicator group for the use of satellite navigation for windfinding

### LATTITUDE: 99L<sub>a</sub>L<sub>a</sub>L

- Identifier: 99 Indicator for data on position follows
- Identifier: L<sub>a</sub>L<sub>a</sub>L<sub>a</sub> Latitude in tenths of degrees

### LONGITUDE: Q<sub>c</sub>L<sub>o</sub>L<sub>o</sub>L<sub>o</sub>L<sub>o</sub>

- Identifier: Q<sub>c</sub> The octant of the globe
- Identifier: L<sub>0</sub>L<sub>0</sub>L<sub>0</sub>L<sub>0</sub> Longitude in tenths of degrees

### MARSDEN SQUARE: MMMUlaUlo

- Identifier and explain: MMM Marsden square
- Identifier and explain:  $U_{la}U_{lo}$  Units digits in the reported latitude and longitude

### SEA LEVEL PRESSURE: 00P<sub>0</sub>P<sub>0</sub>P<sub>0</sub> T<sub>0</sub>T<sub>0</sub>T<sub>0</sub>D<sub>0</sub>D<sub>0</sub>

- Identifier: 00 Indicator for data at the surface level follows
- Identifier: P<sub>o</sub>P<sub>o</sub>P<sub>o</sub> Indicator for pressure of specified levels in whole millibars (thousands digit omitted)
- Identifier:  $T_oT_oT_o$  Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface
- Identifier: D<sub>0</sub>D<sub>0</sub> Dewpoint depression at standard isobaric surfaces beginning with surface level

### SIGNIFICANT ISOBARIC LEVELS: n<sub>1</sub>n<sub>1</sub>P<sub>1</sub>P<sub>1</sub>P<sub>1</sub>T<sub>1</sub>T<sub>1</sub>T<sub>1</sub>D<sub>1</sub>D<sub>1</sub>

- Identifier: n<sub>1</sub>n<sub>1</sub> Number of level. Only surface will be numbered as "00".
- Identifier:  $P_1P_1P_1$  Pressure at specified levels in whole millibars.
- Identifier:  $T_1T_1T_1D_1D_1$  Same temperature/dew point encoding procedures in Part Aapplies.

### 21212

21212 – Data for significant level winds

### SEA LEVEL WIND: nonoPoPoPo dodofofofo

- Identifier: 00 Indicator for wind data at surface level follows:
- Identifier: P<sub>o</sub>P<sub>o</sub>P<sub>o</sub> Indicator for pressure of specified levels in whole millibars (thousands digit omitted)
- Identifier: d<sub>o</sub>d<sub>o</sub> True direction from which the wind is blowing rounded to nearest 5 degrees.
   Report hundreds and tens digits. The unit (0 and 5) is added to the hundreds digit of wind.
- Identifier:  $f_0 f_0 f_0$  Wind speed in knots. Hundreds digit is sum of hundreds digit of speed and unit digit of direction. Example: 295 degrees at 125 knots is encoded as 29625

### SIGNIFICANT ISOBARIC LEVELS: n<sub>1</sub>n<sub>1</sub>P<sub>1</sub>P<sub>1</sub>P<sub>1</sub>d<sub>1</sub>d<sub>1</sub>f<sub>1</sub>f<sub>1</sub>f<sub>1</sub>

- Identifier:  $n_1n_1$  Number of level. Only surface will be numbered as "00".
- Identifier:  $P_1P_1P_1$  Pressure at specified levels in whole millibars.
- Identifier:  $d_1d_1f_1f_1f_1$  Same wind encoding procedures in Part A applies.

**31313, 51515, 61616, 62626** – Same procedures as Part A

### FIGURE K-1. Example TEMP DROP Message.

### **UZPN13 KNHC 010211**

XXAA 51023 99450 71352 15855 99994 08635 24030 00548 //// ////

92592 03817 23552 85273 00916 24555 70803 06366 25055 50539 16957

24631 40702 29757 24634 88999 66301 25149 419//

31313 09608 80158

51515 10190 30900

61616 AF301 01WSC TRACK 51 OB 23

62626 SPL 4510N13483W 0212 MBL WND 23542 AEV 20108 DLM WND 23035 994314

WL150 2335 075=

XXBB 51028 99450 71352 15855 00994 08635 11850 00916 22742 07124

33729 05162 44664 07396 55640 06599 66562 12598 77557 12777 88551

12961 99538 13561 11481 18957 22449 23346 33406 28757 44356 36756

55301 46732

21212 00994 24030 11983 23037 22967 24040 33957 23548 44946 24046

55892 24558 66850 24555 77742 24045 88656 24079 99575 24588 11497

24632 22314 25136 33301 25149

31313 09608 80158

51515 10190 30900

61616 AF301 01WSC TRACK 51 OB 23

62626 SPL 4510N13483W 0212 MBL WND 23542 AEV 20108 DLM WND 23035 994314

WL150 2335 075=

## APPENDIX L

## **DISTRIBUTION**

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HQ ACC/DOW	1
HQ ACC/DOLT	2
HQ AFMC/A3OP	1
HQ AFRC/DOO	2
HQ AFRC/DOT/DOTA/DOVA	3
HQ AFSPC/XOSW	1
HQ AMC/A63W	2
HQ AETC/DOYW	1
HQ AFWA/XO	6
HQ 22AF/DOT	2
HQ 22 AF/XP	1
HQ 22 AF/XPL	1
AFW Technical Library	1
403 WG/DO/XP	2
53 WRS	75
CARCAH (OL-A 53 WRS)	6
17 OWS/CC	1
45 WS/CC	1
45 WS/SPW/XP/SE	3
334 TTS/TTMV 274 OSS/WE	1
374 OSS/WE	1
3246 TW/DOW	2
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Headquarters, Department of the Army/DAMI-POI	2

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AGL-500 Chicago	1
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ANM-500 Seattle	1
ASO-500 Atlanta	1
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AWP-500 Los Angeles	1
Albuquerque ARTCC	2
Atlanta ARTCC	3
Boston ARTCC	3
Honolulu ARTCC	3
Houston ARTCC	3
Jacksonville ARTCC	3
Los Angeles ARTCC	2
Memphis ARTCC	1
Miami ARTCC	3
New York ARTCC	3
Oakland ARTCC	2
San Juan ARTCC	3
Seattle ARTCC	2
Washington ARTCC	2
AMA-500, Oklahoma City, OK	1

AIA-100/AIA-200 AOP-4/AOP-8	3
APA-100/APA-300/APA-500	2
ARS-100/ARS-200	3 2
Miami (QAS) AIFSS	2
San Juan AIFSS	2
San Juan An SS	2
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Commander, Maintenance and Logistics Command Atlantic	2
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Commander, Fifth Coast Guard District	2
Commander, (RE) Seventh Coast Guard District	3
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